

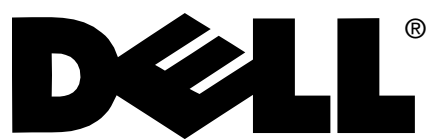
Dell® PowerEdge® 4100/180 and 4100/200 Systems

INSTALLATION AND TROUBLESHOOTING GUIDE



Dell® PowerEdge® 4100/180 and 4100/200 Systems

INSTALLATION AND TROUBLESHOOTING GUIDE



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Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

When Working Inside the Computer

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

Before taking the covers off of the computer, perform the following steps in the sequence indicated:

1. **Turn off the computer and any peripherals.**
2. **Disconnect the computer and peripherals from their power sources. Also, disconnect any telephone or telecommunications lines from the computer.**

Doing so reduces the potential for personal injury or shock.

3. **Touch an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside the computer.**

While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

In addition, take note of these safety guidelines when appropriate:

- To help avoid possible damage to the system board, wait five seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside the computer. To prevent static damage, discharge static electricity from your body before you touch any of the computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

In addition to the preceding precautions, you can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component's antistatic packing material until you are ready to install the component in the computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following caution appears throughout this document to remind you of these precautions:

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

When Using the Computer System

As you use the computer system, observe the following safety guidelines:

- Be sure the monitor and attached peripherals are electrically rated to operate with the AC power available in your location.

- To help prevent electric shock, plug the computer and peripheral power cables into properly grounded power sources. These cables are equipped with three-prong plugs to ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.
- To help protect the computer system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply.
- Be sure nothing rests on the computer system's cables and that the cables are not located where they can be stepped on or tripped over.
- Do not spill food or liquids on the computer. If the computer gets wet, see Chapter 7, “Checking Inside the Computer.”
- Do not push any objects into the openings of the computer. Doing so can cause fire or electric shock by shorting out interior components.
- Keep the computer away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath the computer; do not place the computer in a closed-in wall unit or on a rug.

Preface

About This Guide

This guide provides directions for trained service technicians who are installing system upgrade options in a Dell PowerEdge 4100/180 or Dell PowerEdge 4100/200 computer system or are troubleshooting problems that have temporarily disabled a system. Before calling for technical assistance, follow the recommended procedure(s) in this guide to solve most hardware and software problems yourself.

- Chapter 1, “Introduction,” provides a brief overview of system service features.
- Everyone should read Chapter 2, “Checking the Basics,” for some initial checks and procedures that can be used to solve basic computer problems. It also directs you to the appropriate chapter in this guide for more detailed troubleshooting information and procedures to solve more complex problems.
- Whenever you receive an error message or code, you should read Chapter 3, “Messages and Codes.” This chapter discusses system messages, system beep codes, warning messages, and diagnostics messages.
- If you suspect that the problems are software-related, or you are still having problems after testing the computer’s hardware, read Chapter 4, “Finding Software Solutions.” It provides some general guidelines for analyzing software problems.
- For hardware-related problems, read Chapter 5, “Running the System Diagnostics.” Chapter 6, “Checking the Equipment,” and Chapter 7, “Checking Inside the Computer,” provide troubleshooting procedures for equipment connected to the input/output (I/O) panel of the computer and components inside the computer, respectively. Chapter 7 also provides information on removing the computer covers.
- Chapter 8, “Installing System Board Options,” Chapter 9, “Installing Drives in the External Bays,” and Chapter 10, “Installing Drives in the Internal Bays,” are intended for technicians who want to install or remove options inside the computer, such as dual in-line memory modules (DIMMs), expansion cards, or SCSI devices.
- Chapter 11, “Getting Help,” describes the help tools Dell provides to assist you should you have a problem with the computer. It also explains how and when to call Dell for technical assistance.
- Make a copy of the checklist in Appendix A, “Diagnostics Checklist,” and fill it out as you perform the troubleshooting procedures. If you need to call Dell for technical assistance, use the completed checklist to tell the support technician what procedures you performed to better help the Dell technician give you assistance. If you must return a piece of hardware to Dell, include a filled-out checklist.
- Appendix B, “Diagnostic Video Tests,” discusses the tests for the Video Test Group in the system diagnostics to help you test the monitor.
- Appendix C, “Jumpers and Switches,” is intended for technicians who are troubleshooting the system or adding internal options and need to change jumper or switch settings.
- A table of the abbreviations and acronyms used throughout this guide and in other Dell documentation for the system precedes the index.

Other Documentation You May Need

You may need to reference the following documentation when performing the procedures in this guide:

- The *Dell PowerEdge 4100/180 and 4100/200 Systems User's Guide*, which describes system features and technical specifications, video and small computer system interface (SCSI) device drivers, the System Setup program, software support utilities, and the EISA Configuration Utility.
- The *Dell PowerEdge 4100 Systems Rack Installation Guide*, which provides detailed instructions for installing the system in a rack.
- The *Dell Hardware Instrumentation Package for Intel LANdesk Server Manager User's Guide*, which describes the alert messages issued by this server management software.

You may also have one or more of the following documents:

- Operating system documentation is included with the system if you ordered the operating system software from Dell. This documentation describes how to install (if necessary), configure, and use the operating system software.
- Documentation is included with any options you purchase separately from the system, such as the Dell PowerEdge Expandable RAID Controller SCSI host adapter. This documentation includes information that you need to configure and install these options in the Dell computer. Installation instructions for the options are included in the system documentation.
- Technical information files—sometimes called “readme” files—may be installed on the hard-disk drive to provide last-minute updates about technical changes to the system or advanced technical reference material intended for experienced users or technicians.

*NOTE: Documentation updates are sometimes included with the system to describe changes to the system or software. Always read these updates **before** consulting any other documentation because the updates often contain information that supersedes the information in the other documents.*

Notational Conventions

The following subsections list notational conventions used in this document.

Warnings, Cautions, and Notes

Throughout this guide, there may be blocks of text printed in bold type within boxes or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

NOTE: A NOTE indicates important information that helps you make better use of the computer system.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Keycaps*, the labeling that appears on the keys on a keyboard, are presented in uppercase and enclosed in angle brackets.
Example: <ENTER>
- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.
Example: <CTRL><ALT><ENTER>
- All items on a menu screen are presented in the **HELVETICA** font and in uppercase bold.
Example: **SETUP PASSWORD** category
- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed at that particular point in the discussion.
Example: “Use the **format** command to . . .”

In contrast, commands presented in the Courier font are intended to be typed as part of an instruction.

Example: “Type `format a:` to format the diskette in drive A.”

- *Filenames* and *directory names* are presented in lowercase bold.

Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

Example: **del** [drive:] [path]filename [/p]

- *Command lines* consist of a command and may include one or more of the command’s possible parameters. Command lines are presented in Courier.

Example: `del c:\myfile.doc`

- *Screen text* is text that appears on the screen of the monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in Courier font.

Example: “Type `md c:\dos`, and then press <ENTER>.”

Example: The following message appears on the screen:

No boot device available

- *Variables* are symbols for which you substitute a value. They are presented in italics.

Example: `EISAn` (where *n* represents the expansion-card connector number)

Chapter 1

Introduction

Dell® PowerEdge™ 4100/180 and Dell PowerEdge 4100/200 systems are high-speed, upgradable servers that offer a number of significant service and upgrade features.

The Dell PowerEdge 4100 systems' service features make troubleshooting easy and effective. Every system includes CD-based Dell diagnostics software for diagnosing system problems if the system can boot. The embedded server management hardware monitors temperatures and voltages throughout the system and notifies you if the system overheats or if one of the system cooling fans malfunctions. If the system has an optional power-supply paralleling board and redundant power supplies, the server management hardware also monitors the status of the power supplies.

The Dell PowerEdge 4100 system chassis simplifies removing and replacing computer components. Processor and memory upgrades can be performed without removing the system board. The Dell-designed small computer system interface (SCSI) backplane board and hard-disk drive carriers eliminate the extensive cabling and drive configuration usually required for a SCSI subsystem. The plastic drive rails attached to devices mounted in the external drive bays allow you to remove devices without removing a single screw.

Among the many upgrade options offered for the Dell PowerEdge 4100 systems are a secondary micro-processor, additional main memory, a variety of expansion-card options (including the Dell PowerEdge Expandable RAID Controller host adapter), and additional SCSI CD-ROM, tape, and hard-disk drives.

About This Guide

This guide provides directions for trained service technicians who are installing system options or are troubleshooting problems that have temporarily disabled a Dell PowerEdge system. Before calling for technical assistance, follow the recommended procedure(s) in this guide to solve most hardware and software problems yourself.

- Chapter 2, "Checking the Basics," outlines some initial checks and procedures and also directs you to the appropriate chapter in this guide for more detailed troubleshooting information.
- Whenever you receive an error message or code, you should read Chapter 3, "Messages and Codes."
- If you suspect that the problems are software-related, or you are still having problems after testing the computer's hardware, read Chapter 4, "Finding Software Solutions."
- For hardware-related problems, read Chapter 5, "Running the System Diagnostics." Chapter 6, "Checking the Equipment," and Chapter 7, "Checking Inside the Computer," provide troubleshooting procedures for equipment connected to the input/output (I/O) panel of the computer and components inside the computer, respectively.

Chapter 7 also provides information on removing the computer covers and front bezel.

- If you are installing or removing system options, such as dual in-line memory modules (DIMMs), expansion cards, or SCSI devices, refer to Chapter 8, "Installing System Board Options," Chapter 9, "Installing Drives in the External Bays," or Chapter 10, "Installing Drives in the Internal Bays."

- Chapter 11, “Getting Help,” describes the help tools Dell provides to assist you should you have a problem with the computer. It also explains how and when to call Dell for technical assistance.
- If you are performing troubleshooting procedures, make a copy of Appendix A, “Diagnostics Checklist,” and fill it out. If you need to call Dell for technical assistance, use the completed checklist to tell the support technician what procedures you performed to better help the Dell technician give you assistance. If you must return a piece of hardware to Dell, include a filled-out copy of this checklist.
- Appendix B, “Diagnostic Video Tests,” discusses the tests for the Video Test Group in the system diagnostics to help you test the monitor.
- Appendix C, “Jumpers and Switches,” is intended for technicians who add internal options and need to change jumper or switch settings.
- A table of the abbreviations and acronyms used throughout this guide and in other Dell documentation for the system precedes the index.

Chapter 2

Checking the Basics

If a Dell PowerEdge 4100 computer system is not working as expected, start your troubleshooting with the procedures in this chapter. This chapter guides you through some initial checks and procedures that can solve basic computer problems. It can also direct you to the appropriate chapter in this guide for detailed troubleshooting information and procedures to solve more complex problems.

NOTE: When you see the question, “Is the problem resolved?” in a troubleshooting procedure, perform the operation that caused the problem.

Backing Up Files

If the system is behaving erratically, back up the files immediately. See the documentation that came with the operating system for instructions on how to back up the files.

Basic Checks

The following procedure leads you through the checks necessary to solve some basic computer problems:

1. Was an alert message issued by the Dell HIP server management program?

The Dell Hardware Instrumentation Package (HIP) server management application program generates warning and failure messages for drive, temperature, fan, and power conditions. These messages appear in the simple network management protocol (SNMP) trap log file. To see the trap log, select any enterprise

under the SNMP trap log icon. (More information about the Alert Log window and options is provided in the Dell HIP online help.)

Yes. Go to “Alert Log Messages From the Dell HIP Program” in Chapter 3.

No. Go to step 2.

2. Is the computer wet or damaged?

Yes. Go to Chapter 7, “Checking Inside the Computer.”

No. Go to step 3.

3. Perform the steps in “Checking Connections and Switches” found next in this chapter.

Is the problem resolved?

Yes. The power to the computer system was faulty, or the connections to the computer system were loose. You have fixed the problem.

No. Go to step 4.

4. Perform the steps in “Look and Listen” found later in this chapter.

Did the computer system complete the boot routine?

Yes. Go to step 5.

No. A serious malfunction may have occurred. Go to Chapter 11, “Getting Help.”

5. Did you receive a system message or beep code?

Yes. Go to Chapter 3, “Messages and Codes.”

No. Go to step 6.

6. **Verify the settings in the System Setup program as explained in “The System Setup Program” found later in this chapter.**

Is the problem resolved?

Yes. The system configuration information was incorrect. You have fixed the problem.

No. Go to step 7.

7. **Run the system diagnostics as described in Chapter 5.**

Checking Connections and Switches

Improperly set switches and controls and loose or improperly connected cables are the most likely source of problems for the computer, monitor, or other peripherals (such as a printer, keyboard, mouse, or other external equipment). A quick check of all the switches, controls, and cable connections can easily solve these problems. Figure 2-1 shows the back panel connections on the computer. Figure 2-2 shows the switches and controls on the computer.

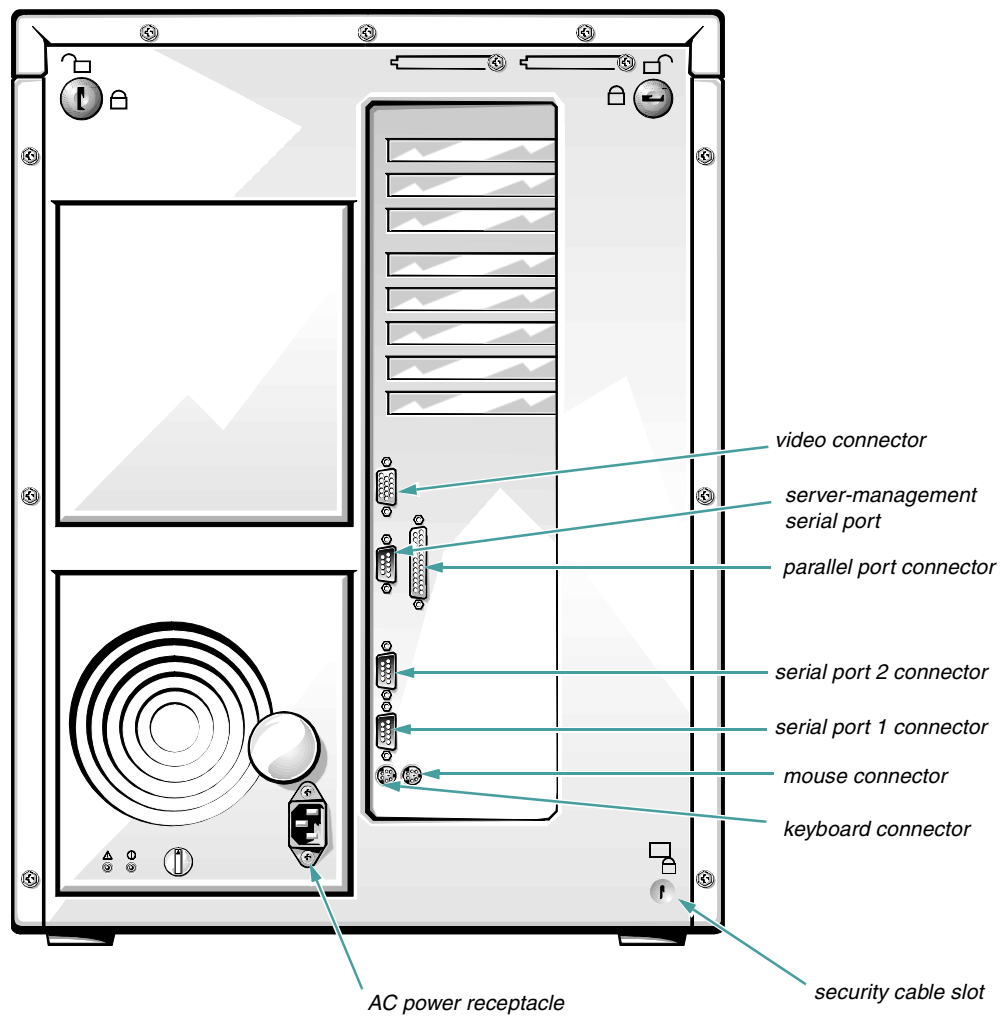


Figure 2-1. Back Panel Features

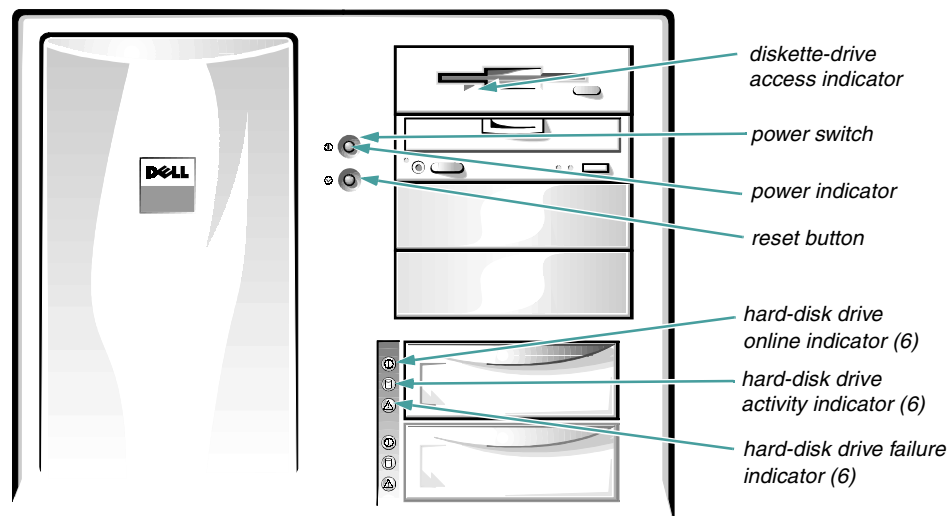


Figure 2-2. Switches and Controls

Complete the following procedure to check all the connections and switches:

1. **Turn off the system, including any attached peripherals (such as the monitor, keyboard, printer, external drives, scanners, or plotters). Disconnect all the alternating current (AC) power cables from their power sources.**
Is the power strip getting power?
Yes. Go to step 5.
No. Go to step 3.
2. **If the computer is connected to a power strip, turn the power strip off and then on again.**
Is the power strip getting power?
Yes. The original electrical outlet probably does not function. Use a different electrical outlet.
No. Go to step 4.
3. **Plug the power strip into another electrical outlet.**
Is the power strip getting power?
Yes. The original electrical outlet probably does not function. Use a different electrical outlet.
No. Go to step 4.

4. **Plug a lamp that you know works into the electrical outlet.**

Does the lamp get power?

Yes. The power strip is probably not functioning properly. Get another power strip.

No. Go to step 5.

5. **Reconnect the system to AC power.**

Make sure that all connections fit tightly together.

6. **Turn on the system.**

Is the problem resolved?

Yes. The connections were loose. You have fixed the problem.

No. Go to step 7.

7. **Is the monitor operating properly?**

Yes. Go to step 8.

No. Go to "Troubleshooting the Monitor" in Chapter 6.

8. **Is the keyboard operating properly?**

Yes. Go to step 9.

No. Go to “Troubleshooting the Keyboard” in Chapter 6.

9. Is the mouse or printer operating properly?

Yes. Continue with “Look and Listen” found next in this chapter.

No. Go to “Troubleshooting I/O Ports” in Chapter 6.

Look and Listen

Looking at and listening to the system is important in determining the source of a problem. Look and listen for the indications described in Table 2-1.

Table 2-1. Boot Routine Indications

Listen for:	Action
An error message	See Chapter 3, “Messages and Codes.”
Alert messages from the Dell HIP software	The server management software has detected a problem inside the computer. See “Alert Log Messages From the Dell HIP Program” in Chapter 3.
The monitor’s power indicator	Most monitors have a power indicator (usually on the front bezel). If the monitor’s power indicator does not come on, see “Troubleshooting the Monitor” in Chapter 6.
The keyboard indicators	Most keyboards have one or more indicators (usually in the upper-right corner). Press the <NUM LOCK> key, the <CAPS LOCK> key, or the <SCROLL LOCK> key to toggle their respective keyboard indicators on and off. If the indicators do not light up, see “Troubleshooting the Keyboard” in Chapter 6.
The diskette-drive access indicator	The diskette-drive access indicator should quickly flash on and off when you access data on the diskette drive. If the diskette-drive access indicator does not light up, see “Troubleshooting the Diskette Drive Subsystem” in Chapter 7.
The hard-disk drive activity indicator	The hard-disk drive activity indicators should quickly flash on and off when you access data on the hard-disk drives. On a system running the Microsoft® Windows® operating system, you can test the drive by opening File Manager and clicking on the icon for drive C. If the hard-disk drive access indicator does not come on, see “Troubleshooting SCSI Hard-Disk Drives” in Chapter 7.
A series of beeps	See Chapter 3, “Messages and Codes.”

Table 2-1. Boot Routine Indications

Listen for:	Action
An unfamiliar constant scraping or grinding sound when you access a drive	Make sure the sound is not caused by the application program you are running. The sound could be caused by a hardware malfunction. See Chapter 11, “Getting Help,” for instructions on getting technical assistance from Dell.
The absence of a familiar sound	When you turn on the system, you should hear the hard-disk drives spin up, and the system tries to access the boot files from the hard-disk drive, the diskette drive, or CD-ROM drive. See Chapter 5, “Running the System Diagnostics.” If the system does not boot, see Chapter 11, “Getting Help.”

If after looking and listening to the computer you have not resolved the problem, continue with the instructions in “The System Setup Program” found next in this chapter.

The System Setup Program

You can easily correct certain system problems by verifying the correct settings in the System Setup program. When you boot the system, the system checks the system configuration information and compares it with the current hardware configuration. If the system hardware configuration doesn’t match the information recorded by the System Setup program, an error message may appear on the screen.

This problem can happen if you changed the system’s hardware configuration and forgot to run the System Setup program. To correct this problem, enter the System Setup program, correct the corresponding System Setup category, and reboot the system. See Chapter 4, “Using the System Setup Program,” in the system *User’s Guide* for detailed instructions on using the System Setup program.

The EISA Configuration Utility

If you are experiencing problems with the system, you may have a conflict between the information stored by the System Setup program and the EISA Configuration Utility. Although the EISA Configuration Utility can read changes from the System Setup program, the change is not recorded into EISA configuration memory until you run the EISA Configuration Utility and save the new information. See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for detailed instructions on using the EISA Configuration Utility and saving new information.

If after using the EISA Configuration Utility you have not resolved the problem, see Chapter 5, “Running the System Diagnostics,” in this guide.

Chapter 3

Messages and Codes

Application programs, operating systems, and the computer itself are capable of identifying problems and alerting you to them. When a problem occurs, a message may appear on the monitor screen, or a beep code may sound.

Several different types of messages can indicate when the system is not functioning properly:

- System messages
- System beep codes
- Warning messages
- Diagnostics messages
- Alert messages

This chapter describes each type of message and lists the possible causes and actions you can take to resolve any problems indicated by a message. To determine what type of message you have received, read the following sections.

System Messages

System messages alert you to a possible operating problem or to a conflict between the software and hardware. If you receive a system message, see Table 3-1 for suggestions on resolving any problems indicated by the message.

NOTE: If the system message you received is not listed in Table 3-1, check the documentation for the application program that was running at the time the message appeared and/or the operating system documentation for an explanation of the message and a recommended action.

Table 3-1. System Messages

Message	Cause	Action
System battery is dead - Replace and run Setup	The battery on the system board is dead.	Replace the battery on the system board, and run the System Setup program to restore the system configuration information. See “Replacing the Battery” in Chapter 8 for details.
System CMOS checksum bad - Run Setup	The CMOS configuration data is corrupted.	Run the System Setup program to restore the system configuration information.
Incorrect drive A type - Run Setup Incorrect drive B type - Run Setup	The installed diskette drive type does not match the diskette drive type in CMOS.	Run the System Setup program to correct the diskette drive type.
Keyboard error Stuck key	A cable or connector may be loose, or the keyboard may be faulty.	Check the keyboard cable and connector for proper connection. If the problem persists, run the Keyboard Test Group in the system diagnostics to determine whether the keyboard or keyboard controller is faulty. See Chapter 5, “Running the System Diagnostics.”
System/Shadow RAM failed at offset:	One or more DIMMs may be improperly seated or faulty.	Remove and reseat the DIMMs. See “Installing DIMMs” and “Removing DIMMs” in Chapter 8.
Operating system not found	The diskette, CD, or hard-disk drive may not have a bootable operating system on it.	Insert a diskette or CD with a bootable operating system, or load a bootable operating system on the hard-disk drive. Run the System Set Test Group to determine whether the microprocessor chip is faulty. See Chapter 5, “Running the System Diagnostics.”
System cache error - cache disabled	The microprocessor chip on the system board may be malfunctioning.	Run the System Set Test Group to determine whether the microprocessor chip is faulty. See Chapter 5, “Running the System Diagnostics.”
System timer error	A chip on the system board may be malfunctioning.	Run the System Set Test Group to determine whether the system timers are faulty. See Chapter 5, “Running the System Diagnostics.” A faulty chip on the system board usually requires that you replace the system board.
Real-time clock error	The RTC on the system board may be malfunctioning.	Run the System Set Test Group to determine whether the RTC on the system board is faulty. See Chapter 5, “Running the System Diagnostics.”

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages (Continued)

Message	Cause	Action
Keyboard controller error	A cable or connector may be loose, or the keyboard controller may be faulty.	Check the keyboard cable and connector for proper connection. If the problem persists, run the Keyboard Test Group in the system diagnostics to determine whether the keyboard or keyboard controller is faulty. See Chapter 5, “Running the System Diagnostics.”
EISA configuration NVRAM bad	The EISA jumper may have been accidentally installed.	Remove the EISA jumper, reboot the system, and restore the EISA configuration parameters. See Chapter 5, “Using the EISA Configuration Utility,” in the <i>User’s Guide</i> .
EISA configuration error	The EISA data in NVRAM does not match the installed EISA expansion cards.	Verify that any installed EISA expansion cards are properly seated, and then run the EISA Configuration Utility to verify that the configuration parameters are correct. See Chapter 5, “Using the EISA Configuration Utility,” in the <i>User’s Guide</i> .
Invalid CPU speed detected - check jumpers	The microprocessor-speed jumper plug may be absent or installed on the wrong pins.	Check the microprocessor speed jumpers. See Table C-1.
Resource conflict Warning: IRQ not initialized Expansion ROM not initialized	The BIOS detected a resource conflict while configuring a Plug and Play ISA or PCI expansion card.	See “Resolving Resource Conflicts” in Chapter 5 in the <i>User’s Guide</i> .
System configuration data write error	A chip on the system board may be malfunctioning.	Run the System Set Test Group. See Chapter 5, “Running the System Diagnostics.” A faulty chip on the system board usually requires that you replace the system board.
System memory size has changed - Run Configuration Utility	DIMM memory may have been added or removed, or one or more DIMMs may be improperly seated or faulty.	Remove and reseal the DIMMs. See “Installing DIMMs” and “Removing DIMMs” in Chapter 8. If the problem persists, run the RAM Test Group in the system diagnostics. See Chapter 5, “Running the System Diagnostics.”
Stepping of CPU1 is less than sA1 - System halted!	A Pentium® Pro microprocessor that is not supported by the system is installed in the PROCESSOR1 socket.	Replace the microprocessor with a correct version of the Pentium Pro microprocessor from Dell. See “Upgrading the Microprocessor or Installing a Secondary Microprocessor” in Chapter 8 for details.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-1. System Messages (Continued)

Message	Cause	Action
Stepping of CPU2 is less than sA1 - System halted!	A Pentium Pro microprocessor that is not supported by the system is installed in the PROCESSOR2 socket.	Replace the microprocessor with a correct version of the Pentium Pro microprocessor from Dell. See “Upgrading the Microprocessor or Installing a Secondary Microprocessor” in Chapter 8 for details.
Stepping of CPU is less than sA1 - System halted!	A Pentium Pro microprocessor that is not supported by the system is installed.	Replace the microprocessor with a correct version of the Pentium Pro microprocessor from Dell. See “Upgrading the Microprocessor or Installing a Secondary Microprocessor” in Chapter 8 for details.
Nonidentical CPUs - System halted!	The cache memory size of the two Pentium Pro microprocessors must match.	Replace one of the microprocessors so that the cache size of the two microprocessors matches. See “Upgrading the Microprocessor or Installing a Secondary Microprocessor” in Chapter 8 for details.
Invalid CPU speed detected - Check speed jumpers. System halted.	The microprocessor speed detected is not 180 MHz or 200 MHz.	Check the microprocessor speed jumpers. See Table C-1.
Power supply paralleling board firmware download failed System backplane firmware download failed	The server-management bus cable connection to the SCSI backplane board may be loose, preventing the firmware from downloading during system start-up.	Check the server-management bus cable connections to the system board (labeled “SMB BACKPLANE”) and SCSI backplane (labeled “SMB”).
Embedded server management firmware download failed	The embedded server management memory may be temporarily corrupted.	Turn off the system to clear the memory, then restart the system.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

System Beep Codes

When errors occur during a boot routine that cannot be reported on the monitor, the computer may emit a series of beeps that identify the problem. The *beep code* is a pattern of sounds: for example, one beep, followed by a second beep, and then a burst of three beeps (code 1-1-3) means that the computer was unable to read the data in nonvolatile random-access memory (NVRAM). This information is valuable to the Dell support staff if you need to call for technical assistance.

When a beep code is emitted, write it down on a copy of the Diagnostics Checklist found in Appendix A, and then look it up in Table 3-2. If you are unable to resolve the problem by looking up the meaning of the beep code, use the system diagnostics to identify a more serious cause. If you are still unable to resolve the problem, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Table 3-2. System Beep Codes

Code	Cause	Action
1-2	Invalid expansion ROM checksum	An expansion card could be improperly seated or faulty. Ensure that all expansion cards are properly seated, then reboot the system. Refer to the documentation that came with the expansion card for troubleshooting information.
1-2-2-3	Invalid BIOS ROM checksum	Fatal error. This error usually requires that you replace the BIOS firmware. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.
1-3-1-1	DRAM refresh failure	Remove and reseat the DIMMs. See “Installing DIMMs” and “Removing DIMMs” in Chapter 8. Reboot the system. If the problem persists, have the system board replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.
1-3-1-3	Keyboard controller error	Check the keyboard cable and connector for proper connection. If the problem persists, run the Keyboard Test Group in the system diagnostics to determine whether the keyboard or keyboard controller is faulty. See Chapter 5, “Running the System Diagnostics.”
1-3-3-1	No DIMM memory installed	Remove and reseat the DIMMs. See “Installing DIMMs” and “Removing DIMMs” in Chapter 8. If the problem persists, have the system board replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-2. System Beep Codes (Continued)

Code	Cause	Action
1-3-4-1 1-3-4-3 1-4-1-1	DRAM failure	Remove and reseal the DIMMs. See “Installing DIMMs” and “Removing DIMMs” in Chapter 8. If the problem persists, run the RAM Test Group in the system diagnostics. See Chapter 5, “Running the System Diagnostics.” If the problem still persists, have the system board replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.
1-4-2-1	CMOS failure	Run the System Test Group in the system diagnostics to isolate the problem. See Chapter 5, “Running the System Diagnostics.”
1-4-3-1	Memory controller failure or DIMM failure	Check the DIMMs to ensure that they are properly seated. If the problem persists, run the RAM Test Group in the system diagnostics. See Chapter 5, “Running the System Diagnostics.”
2-2-3-1	Unexpected interrupt	Ensure that all expansion cards are properly seated, then reboot the system.
3-2-2-1 4-2-4-4	Gate A20 failure	Have the system board replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.
4-2-4-3	Keyboard controller error	Have the system board replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Warning Messages

A warning message alerts you to a possible problem and asks you to do something before execution continues. For example, before you format a diskette, a message may warn you that you may lose all data on the diskette as a way to protect against inadvertently erasing or writing over the data. These warning messages usually interrupt the procedure and require you to respond by typing a y (yes) or n (no).

NOTE: Warning messages are generated by either the application programs or the operating system. See Chapter 4, “Finding Software Solutions,” and the

documentation that accompanied the operating system and application programs.

Diagnostics Messages

When you run a test group or subtest in the system diagnostics, an error message may result. These particular error messages are not covered in this chapter. Record the message on a copy of the Diagnostics Checklist found in Appendix A, then see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Alert Log Messages From the Dell HIP Program

The Dell Hardware Instrumentation Package (HIP) server management application program generates alert messages which appear in the simple network management protocol (SNMP) trap log file. To see the trap log, select any enterprise under the SNMP trap log icon. (More information about the Alert Log window and

options is provided in the Dell HIP online help and the Dell HIP *User's Guide*.)

Alert log messages consist of information, status, warning, and failure messages for drive, temperature, fan, and power conditions. They can assist you with identifying a problem and may provide you with information to help you resolve the problem.

Table 3-3 alphabetically lists critical HIP alert log mes-

Table 3-3. Dell HIP Alert Log Messages

Message	Cause	Action
Composite drive failure detected.	A composite drive has failed in the specified server. If possible, the chassis number is provided.	Notify the supervisor. Determine which physical drive(s) have failed within the composite, and remove and replace the failed drive(s). You will then need to configure the drive. If a drive replaced was not a redundant drive, the information contained on that drive is lost.
Fan sensor detected a failure.	A failure of one or more fans was detected by the thermal-monitoring facility in the specified server. If possible, the fan number is also provided.	Check for a possible blockage on or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections. If the problem persists, replace the fan. See "Replacing a Cooling Fan" in Chapter 8.
Fan sensor warning detected.	A fan sensor reading on the specified server has exceeded the user-settable thresholds. If possible, the fan number is also provided.	Check for a possible blockage on or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections. If the problem persists, replace the fan. See "Replacing a Cooling Fan" in Chapter 8.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-3. Dell HIP Alert Log Messages (Continued)

Message	Cause	Action
Memory ECC fault detected.	An ECC error has occurred in system memory.	Run the appropriate memory test(s) in the system diagnostics. See Chapter 5, “Running the System Diagnostics,” for more information.
Physical drive failure detected.	A physical drive, which is not part of a composite array, has failed in the specified server. If possible, the chassis number and drive number are also provided.	Notify the supervisor. Remove and replace the drive.
Power supply degraded redundancy detected.	In a system with redundant power supplies, more power is being drawn from the pair of power supplies than one of the power supplies could support.	Reduce power consumption by disconnecting some peripherals or cards.
Power supply lost redundancy detected.	In a system with redundant power supplies, one power supply has been disconnected or has failed. (If a power supply has failed, you should be receiving voltage and current failure messages as well.)	Make sure both power supplies are properly connected to their power sources.
Temperature sensor violation detected.	A thermal probe in the specified server has exceeded temperature range. If possible, the chassis number and probe number are also provided.	Check for a fan failure. If the problem persists, replace the fan. See “Replacing a Cooling Fan” in Chapter 8.
Temperature sensor warning detected.		

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 3-3. Dell HIP Alert Log Messages (Continued)

Message	Cause	Action
Voltage sensor detected a failure.	A failure has occurred with the system power supply or voltage probe(s) on the SCSI backplane board in the specified server. If possible, the chassis number and probe number are also provided.	Check the power supply and SCSI backplane board connections. If the power supply is connected properly, replace the power supply (or, if possible, switch it with another power supply that is working properly to determine whether the power supply is the problem). See “Replacing a Power Supply in Chapter 7. If the problem persists, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.
Voltage sensor warning detected.	The voltage probe on the backplane board or system board has exceeded its range.	If the problem persists, check the SCSI backplane board connections. If the power supply is connected properly, replace the power supply (or, if possible, switch it with another power supply that is working properly to determine whether the power supply is the problem). If the problem persists, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

SCSI Hard-Disk Drive Indicator Codes

The three light-emitting diode (LED) indicators adjacent to each of the six SCSI hard-disk drive bays provide information on the status of the SCSI hard-disk drives. The SCSI backplane firmware controls the drive online and drive fault indicators, while the drive access indicator is usually controlled by the drive itself.

Table 3-4 lists the drive indicator patterns established by the SCSI backplane firmware. Different patterns are displayed as drive events occur in the system. For example, in the event of a hard-disk drive failure, the “drive failed” pattern appears. After the drive is selected for removal, the “drive being prepared for removal” pattern appears, followed by the “drive ready for insertion or removal” pattern. After the replacement drive is installed, the “drive being prepared for operation” pattern appears, then the “drive online” pattern.

Table 3-4. SCSI Hard-Disk Drive Indicator Patterns

Condition	Indicator Pattern
Identify drive	All three drive status indicators blink simultaneously.
Drive being prepared for removal	The three drive status indicators are flashed sequentially.
Drive ready for insertion or removal	All three indicators are off.
Drive being prepared for operation	The drive online indicator is on. The drive activity light may flash briefly.
Drive bay empty	All three indicators are off.
Drive predicted failure	The drive online indicator turns off. The drive fault indicator blinks on briefly each second.
Drive failed	The drive online indicator turns off. The drive fault indicator blinks off briefly each second.
Drive rebuilding	The drive online indicator blinks rapidly.
Drive online	The online indicator is on.

Chapter 4

Finding Software Solutions

Because most computers have several application programs installed in addition to the operating system, isolating a software problem can be confusing. Software errors can also appear to be hardware malfunctions at first. Software problems can result from the following circumstances:

- Improper installation or configuration of a program
- Input errors
- Device drivers that may conflict with certain application programs
- Interrupt conflicts between devices

You can confirm that a computer problem is caused by software by running the System Set Test Group as described in Chapter 5, “Running the System Diagnostics.” If all tests in the test group complete successfully, the error condition is most likely caused by software.

This chapter provides some general guidelines for analyzing software problems. For detailed troubleshooting information on a particular program, see the documentation that accompanied the software or consult the support service for the software.

Installing and Configuring Software

The user should check newly acquired programs and files for viruses with virus-scanning software before installing the programs on the computer’s hard-disk drive. Viruses, which are pieces of code that can replicate themselves, can quickly use all available system memory, damage and/or destroy data stored on the hard-disk drive, and permanently affect the performance of the programs they infect. Several commercial virus-scanning programs are

available for purchase, and most bulletin board services (BBSs) archive freely distributed virus-scanning programs that you can download with a modem.

Before installing a program, the user should read its documentation to learn how the program works, what hardware it requires, and what its defaults are. A program usually includes installation instructions in its accompanying documentation and a software installation routine on its program diskettes.

The software installation routine assists users in transferring the appropriate program files to the computer’s hard-disk drive. Installation instructions may provide details about how to configure the operating system to successfully run the program. Users should always read the installation instructions before running a program’s installation routine.

When users run the installation routine, they should be prepared to respond to prompts for information about how the computer’s operating system is configured, what type of computer they have, and what peripherals are connected to the computer.

Using Software

The following subsections discuss errors that can occur as a result of software operation or configuration.

Error Messages

Error messages can be produced by an application program, the operating system, or the computer. Chapter 3, “Messages and Codes,” discusses the error messages that are generated by the system. If you receive an error message that is not listed in Chapter 3, check the operating system or application program documentation.

Input Errors

If a specific key or set of keys is pressed at the wrong time, a program may give you unexpected results. See the documentation that came with the application program to make sure that the values or characters you are entering are valid.

Make sure that the operating environment is set up to accommodate the programs you use. Keep in mind that whenever you change the parameters of the computer's operating environment, you may affect the successful operation of the programs. Sometimes, after modifying the operating environment, you may need to reinstall a program that no longer runs properly.

Program Conflicts

Some programs may leave portions of their setup information behind, even though you have exited from them. As a result, other programs cannot run. Rebooting the system can confirm whether or not these programs are the cause of the problem.

There are also programs that use specialized subroutines called *device drivers* that can also cause problems with the computer system. For example, a variation in the way the data is sent to the monitor may require a special screen driver program that *expects* a certain kind of video mode or monitor. In such cases, you may have to develop an alternative method of running that particular program—the creation of a boot file made especially for that program, for example. Call the support service for the software you are using to help you with this problem.

Avoiding Interrupt Assignment Conflicts

Problems can arise if two devices attempt to use the same interrupt request (IRQ) line. To avoid this type of conflict, check the documentation for the default IRQ line setting for each installed expansion card. Then consult Table 4-1 to configure the card for one of the available IRQ lines.

Table 4-1. Default IRQ Line Assignments

IRQ Line	Used/Available
IRQ0	Used by the system timer
IRQ1	Used by the keyboard to signal that the output buffer is full
IRQ2	Used by interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Used by serial port 2
IRQ4	Used by serial port 1
IRQ5	Available
IRQ6	Used by the diskette/tape drive controller
IRQ7	Used by the parallel port
IRQ8	Used by the RTC
IRQ9	Available
IRQ10	Available
IRQ11	Available
IRQ12	Used by the mouse port
IRQ13	Used by the math coprocessor (if applicable)
IRQ14	Available
IRQ15	Available

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Chapter 5

Running the System Diagnostics

Unlike many diagnostic programs, Dell's system diagnostics helps you check the computer's hardware without any additional equipment and without destroying any data. By using the diagnostics, you can have confidence in the computer system's operation. And if you find a problem you cannot solve by yourself, the diagnostic tests can provide you with important information you will need when talking to Dell's service and support personnel.

CAUTION: Use the system diagnostics to test *only* Dell computer systems. Using this program with other computers may cause incorrect computer responses or result in error messages.

Features of the System Diagnostics

The system diagnostics provides a series of menus and options from which you choose particular test groups or subtests. You can also control the sequence in which the tests are run. The diagnostic test groups or subtests also have these helpful features:

- Options that let you run tests individually or collectively
- An option that allows you to choose the number of times a test group or subtest is repeated
- The ability to display or print out test results or to save them in a file

- Options to temporarily suspend testing if an error is detected or to terminate testing when an adjustable error limit is reached
- A menu category called **ABOUT** that briefly describes each test and its parameters
- Status messages that inform you whether test groups or subtests were completed successfully
- Error messages that appear if any problems are detected

When to Use the System Diagnostics

Whenever a major component or device in the computer system does not function properly, you may have a component failure. As long as the microprocessor and the input and output components of the computer system (the monitor, keyboard, or CD-ROM drive) are working, you can use the system diagnostics. If you know what component(s) you need to test, simply select the appropriate diagnostic test group(s) or subtest(s). If you are unsure about the scope of the problem, read the rest of this chapter.

Starting the System Diagnostics

The system diagnostics is run directly from the *Dell Server Assistant* CD. See Chapter 2, “Using the Dell Server Assistant CD” in the system *User’s Guide* for information on running the CD.

Follow these steps to run the diagnostics from the *Dell Server Assistant* CD:

1. **Turn on the computer.**
2. **Boot the system from the *Dell Server Assistant* CD.**

If the system fails to boot, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

3. **From the Main Menu, select the **RUN SYSTEM DIAGNOSTICS** option from the **RUN SYSTEM UTILITIES** category.**

NOTE: Before you read the rest of this chapter, you may want to start the system diagnostics so you can see it on the screen of the monitor.

When you start the diagnostics, the Dell logo screen appears, followed by a message telling you that the diagnostics is loading. Before the diagnostics loads into memory, a program tests the random-access memory (RAM) that will be used by the diagnostics.

If no errors are found in RAM, the diagnostics loads, and the Diagnostics Menu appears (see Figure 5-1). The menu allows you to run all or specific diagnostic tests or to exit to the *Dell Server Assistant* CD main menu.

For a quick check of the system, select the **RUN QUICK TESTS** option. This option runs only the subtests that do not require user interaction and that do not take a long time to run. Dell recommends that you choose this option first to increase the odds of tracing the source of the problem quickly. For a complete check of the system, select the **RUN ALL TESTS** option. To check a particular area of the system, select the **RUN SPECIFIC TESTS** option.

To select an option from this menu, highlight the option and press <ENTER>, or press the key that corresponds to the highlighted letter in the option you choose.

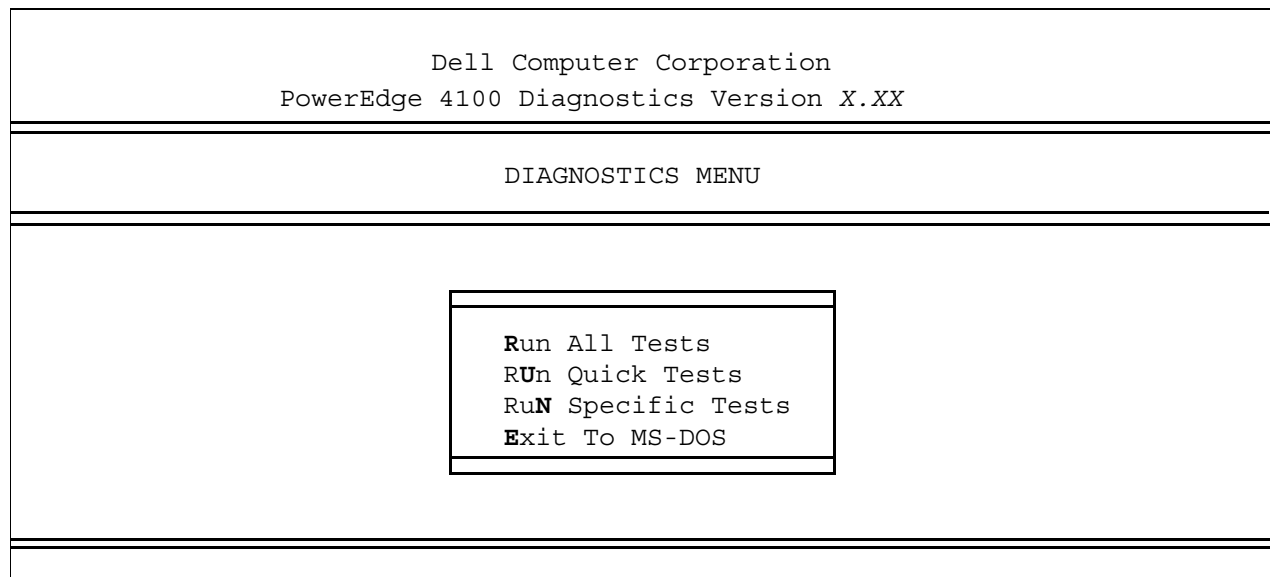


Figure 5-1. Diagnostics Menu

How to Use the System Diagnostics

When you select **RUN SPECIFIC TESTS** from the Diagnostics Menu, the main screen of the diagnostics appears (see Figure 5-2). The main screen lists the diagnostic test groups, gives information about the configuration of the computer system, and allows you to select categories from a menu. From this screen, you can enter two other types of screens.

Information on the main screen of the diagnostics is presented in the following five areas:

- Two lines at the top of the screen identify the diagnostics and give its version number.
- On the left side of the screen, the Test Group area lists the diagnostic test groups in the order they will run if you select **ALL** from the **RUN** menu category.
- Press the up- or down-arrow key to highlight a test group.
- On the right side of the screen, the System Configuration area lists the computer's current hardware settings.
- On the lower-right side of the screen, the Hard-Disk Drive Parameters area displays information about any installed integrated drive electronics (IDE) hard-disk drive(s). Because the system supports only small computer system interface (SCSI) drives, both **DRIVE 0** and **DRIVE 1** should display **NONE** rather than any hard-disk drive parameters.
- Two lines at the bottom of the screen make up the menu area. The first line lists the categories you can select; press the left- or right-arrow key to highlight a menu category. The second line gives information about the category currently highlighted.

Dell Computer Corporation PowerEdge 4100 Diagnostics Version X.XX																																																																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 2px;">Available Test Groups</th> </tr> </thead> <tbody> <tr><td style="padding: 2px;">RAM</td></tr> <tr><td style="padding: 2px;">System Set</td></tr> <tr><td style="padding: 2px;">Video</td></tr> <tr><td style="padding: 2px;">Keyboard</td></tr> <tr><td style="padding: 2px;">Mouse</td></tr> <tr><td style="padding: 2px;">Diskette Drives</td></tr> <tr><td style="padding: 2px;">Hard-Disk Drives (Non-SCSI)</td></tr> <tr><td style="padding: 2px;">Serial/Infrared Ports</td></tr> <tr><td style="padding: 2px;">Parallel Ports</td></tr> <tr><td style="padding: 2px;">SCSI Devices</td></tr> </tbody> </table>	Available Test Groups	RAM	System Set	Video	Keyboard	Mouse	Diskette Drives	Hard-Disk Drives (Non-SCSI)	Serial/Infrared Ports	Parallel Ports	SCSI Devices	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center; padding: 2px;">System Configuration</th> </tr> </thead> <tbody> <tr><td style="padding: 2px;">Processor</td><td style="padding: 2px;"></td><td style="padding: 2px;">Pentium Pro</td></tr> <tr><td style="padding: 2px;">Memory</td><td style="padding: 2px;"></td><td style="padding: 2px;">64 MB</td></tr> <tr><td style="padding: 2px;">Secondary Cache</td><td style="padding: 2px;"></td><td style="padding: 2px;">128 KB</td></tr> <tr><td style="padding: 2px;">Video</td><td style="padding: 2px;"></td><td style="padding: 2px;">SVGA, 1024K</td></tr> <tr><td style="padding: 2px;">Keyboard</td><td style="padding: 2px;"></td><td style="padding: 2px;">101 Key</td></tr> <tr><td style="padding: 2px;">Diskette Drives</td><td style="padding: 2px;">A: 1.4MB, B: None</td><td style="padding: 2px;"></td></tr> <tr><td style="padding: 2px;">Serial Ports</td><td style="padding: 2px;"></td><td style="padding: 2px;">2</td></tr> <tr><td style="padding: 2px;">Parallel Ports</td><td style="padding: 2px;"></td><td style="padding: 2px;">1</td></tr> <tr><td style="padding: 2px;">Mouse</td><td style="padding: 2px;"></td><td style="padding: 2px;">PS/2 2-button</td></tr> <tr><td style="padding: 2px;">Modems</td><td style="padding: 2px;"></td><td style="padding: 2px;">None</td></tr> <tr><td style="padding: 2px;">SCSI Devices</td><td style="padding: 2px;"></td><td style="padding: 2px;">2</td></tr> <tr><td style="padding: 2px;">Network Interface</td><td style="padding: 2px;"></td><td style="padding: 2px;">None</td></tr> <tr><td style="padding: 2px;">Serial IR Ports</td><td style="padding: 2px;"></td><td style="padding: 2px;">Integrated</td></tr> <tr><td style="padding: 2px;">Audio</td><td style="padding: 2px;"></td><td style="padding: 2px;">None</td></tr> <tr><td style="padding: 2px;">0</td><td style="padding: 2px;">IDE Drive Information</td><td style="padding: 2px;">NONE</td></tr> <tr><td style="padding: 2px;">1</td><td style="padding: 2px;"></td><td style="padding: 2px;">NONE</td></tr> <tr><td style="padding: 2px;">2</td><td style="padding: 2px;"></td><td style="padding: 2px;">NONE</td></tr> <tr><td style="padding: 2px;">3</td><td style="padding: 2px;"></td><td style="padding: 2px;">NONE</td></tr> </tbody> </table>	System Configuration			Processor		Pentium Pro	Memory		64 MB	Secondary Cache		128 KB	Video		SVGA, 1024K	Keyboard		101 Key	Diskette Drives	A: 1.4MB, B: None		Serial Ports		2	Parallel Ports		1	Mouse		PS/2 2-button	Modems		None	SCSI Devices		2	Network Interface		None	Serial IR Ports		Integrated	Audio		None	0	IDE Drive Information	NONE	1		NONE	2		NONE	3		NONE
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Main: Run Select Subtest Options Test Limits About Key-Help Quit Display the Run Menu. Press Q to Quit																																																																					

NOTE: The options displayed on the screen should reflect the hardware configuration of the computer system.

Figure 5-2. System Diagnostics Screen

Confirming the System Configuration Information

When you boot the system from the *Dell Server Assistant* CD, the system diagnostics checks the system configuration information and displays it in the System Configuration area on the main screen.

The following sources supply this configuration information for the system diagnostics:

- The system configuration information settings (stored in nonvolatile random-access memory [NVRAM]) that you selected while using the System Setup program
- Identification tests of the microprocessor, the video controller, the keyboard controller, and other key components
- Basic input/output system (BIOS) configuration information temporarily saved in RAM

Do not be concerned if the System Configuration area does not list the names of all the components or devices you know are part of the computer system. For example, you may not see a printer listed, although you know one is attached to the computer. Instead, the printer is listed as a parallel port. The computer recognizes the parallel port as LPT1, which is an address that tells the computer where to send outgoing information and where to look for incoming information. Because the printer is a parallel communications device, the computer recognizes the printer by its LPT1 address and identifies it as a parallel port.

How to Use the Menu

One of the menu categories is already highlighted. You can move the highlight from one category to another by pressing the left- or right-arrow key. As you move from one menu category to another, a brief explanation of the currently highlighted category appears on the bottom line of the screen.

If you want more information about a test group or subtest, move the highlight to the **ABOUT** category and press <ENTER>. After reading the information, press the <ESC> key to return to the previous screen.

Main Menu Categories

Eight categories are listed in the Main menu of the diagnostics main screen: **RUN**, **SELECT**, **SUBTEST**, **OPTIONS**, **TEST LIMITS**, **ABOUT**, **KEY-HELP**, and **QUIT**. (An additional category, **DISPLAY THE RUN MENU**, returns you to the Diagnostics Menu described earlier in this chapter.)

*NOTE: Before running any test groups or subtests (by selecting **RUN**), you should consider setting global parameters within the **OPTIONS** category. They offer you greater control over how the test groups or subtests are run and how their results are reported.*

There are two ways to select a menu category:

- Look on the screen to see which letter in the category is capitalized, and type that letter (for example, type **r** to select the **RUN** category).
- Move the highlight to the category you wish to select by pressing the left- or right-arrow key, and then press <ENTER>.

Whenever one of the eight categories is selected, additional choices become available.

The following subsections explain the menu categories as listed from left to right in the Main menu.

Run

RUN displays five categories: **ONE**, **SELECTED**, **ALL**, **KEY-HELP**, and **QUIT MENU**. If you select **ONE**, all the subtests within the highlighted test group are run. If you choose **SELECTED**, only the selected test groups or the subtests that you selected within the test groups are run. If you select **ALL**, all of the subtests in all of the test groups are run. (The test groups or subtests are run in the same order as they are listed.)

The **KEY-HELP** category displays a list of key controls available for the particular category you have chosen.

The **QUIT MENU** category returns you to the Main menu.

Select

SELECT allows you to select individual test groups to tailor the testing process to your particular needs. You can choose one or more test groups and run them sequentially or individually. When you choose **SELECT**, five categories

are displayed: **ALL**, **ONE**, **CLEAR ALL**, **KEY-HELP**, and **QUIT MENU**.

To select all the test groups, press the <ENTER> key when **ALL** is highlighted in the Select menu.

To select an individual test group, highlight the test group and press the <SPACEBAR> or highlight **ONE** and press <ENTER>. Press the up- or down-arrow key to change the highlighted test group.

To reverse a test group selection, highlight the test group and press the <SPACEBAR>. To clear all selections, select **CLEAR ALL**.

The **KEY-HELP** category displays a list of key controls available for the particular category you have chosen. The **QUIT MENU** category returns you to the Main menu.

Subtest

Most of the test groups consist of several subtests. Use the **SUBTEST** category to select individual subtests within the test group(s).

When you select **SUBTEST**, many of the same categories as those on the Main menu are displayed: **RUN**, **SELECT**, **OPTIONS**, **TEST LIMITS**, **ABOUT**, **KEY-HELP**, and **QUIT MENU**. Each of these categories is explained in the following subsections.

Run Under Subtest

RUN in the Subtest menu displays five categories: **ONE**, **SELECTED**, **ALL**, **KEY-HELP**, and **QUIT MENU**. If you select **ONE**, only the highlighted subtest is run. If you select **SELECTED**, only the selected subtests are run. If you select **ALL**, all of the subtests listed on the screen are run. (The subtests are run in the same order as they are listed.)

The **KEY-HELP** category displays a list of key controls available. The **QUIT MENU** category returns you to the previous menu.

Select Under Subtest

SELECT in the Subtest menu allows you to select individual subtests to tailor the testing process to your particular needs. You can choose one or more subtests from the list.

When you choose **SELECT**, five categories are displayed: **ALL**, **ONE**, **CLEAR ALL**, **KEY-HELP**, and **QUIT MENU**.

To select all the subtests, press the <ENTER> key when **ALL** is highlighted in the Select menu. To select an individual subtest, highlight the subtest and press the <SPACEBAR> or highlight **ONE** and press <ENTER>. Press the up- or down-arrow key to highlight a subtest to be selected.

To reverse a subtest selection, highlight the subtest and press the <SPACEBAR>. To clear all selections, select **CLEAR ALL**.

The **KEY-HELP** category displays a list of key controls available. The **QUIT MENU** category returns you to the previous menu.

Options Under Subtest

The **OPTIONS** category in the Subtest menu functions the same way as the **OPTIONS** category in the Main menu. For information on this category, see “Options” found later in this chapter.

Test Limits Under Subtest

The **TEST LIMITS** category in the Subtest menu functions the same way as the **TEST LIMITS** category in the Main menu. For information on this category, see “Test Limits” found later in this chapter.

About Under Subtest

The **ABOUT** category in the Subtest menu displays information about the highlighted subtest.

Key-Help Under Subtest

The **KEY-HELP** category in the Subtest menu displays a list of key controls available.

Quit Menu Under Subtest

The **QUIT MENU** category in the Subtest menu returns you to the Main menu.

Table 5-1. Option Parameters

Option Limit	Possible Values
NUMBER OF TIMES TO REPEAT TEST(S)	0001 through 9999 , or 0000 , which loops indefinitely until you press the <CTRL> and <BREAK> keys. The default is 1 .
MAXIMUM ERRORS ALLOWED	0000 through 9999 , where 0000 means that there is no error limit. The default is 1 .
PAUSE FOR USER RESPONSE	YES, NO Allows you to decide whether tests will wait for user input. The default is YES to wait for user input.
OUTPUT DEVICE FOR STATUS MESSAGES	DISPLAY, PRINTER, FILE If you have a printer attached to the computer, you can use it to print the status messages, if any, that are generated when a test runs. (The printer must be turned on and in the online mode to print.) If you select FILE , the messages are printed to a file named result in diskette drive A. The default is DISPLAY .
OUTPUT DEVICE FOR ERROR MESSAGES	DISPLAY, PRINTER, FILE This parameter has the same effect as the OUTPUT DEVICE FOR STATUS MESSAGES parameter, except that it pertains only to error messages. The default is DISPLAY .

Options

Table 5-1 lists all of the possible values for each global parameter of **OPTIONS**. A brief description of each parameter follows the table. To change **OPTIONS** parameters, press the <SPACEBAR>, the left- and right-arrow keys, or the plus (+) and minus (–) keys.

limit on the number of errors that can occur—testing will not be stopped, regardless of the number of errors.

Number of Times to Repeat Test(s)

This parameter specifies the number of times the tests run when you select **RUN**. To change the default, type in the desired value. If you type 0 (zero), the tests will run indefinitely.

Maximum Errors Allowed

This parameter specifies the maximum number of errors that can occur before testing is stopped. The error count begins from zero each time you run a subtest or test group individually or each time you select **ALL** to run all of them. To change the default, type in the desired value. If you type 0 (zero), you are specifying that there be no

Pause for User Response

If this parameter value is set to **YES**, the diagnostics pauses when one of the following occurs:

- Your interaction is needed to verify the Video Test Group screens or the Keyboard Test Group key functions or other types of interaction such as inserting a diskette.
- The maximum error limit is reached.

If the **PAUSE** parameter is set to **NO**, the diagnostics ignores some subtests that require your interaction; certain subtests can run only if this option is set to **YES** because they require user interaction. Use the **PAUSE** parameter in situations where you may want to prevent subtests that require user interaction from running—such as when you run the diagnostics overnight.

Output Device for Status Messages

Ordinarily, all status messages appear only on the screen. This parameter allows you to direct status messages to either a printer or a file, in addition to the screen. If you choose the **FILE** option, status messages are written to a file named **result**. This file is automatically created on a diskette in drive A when you run the diagnostics. If the **result** file already exists on the diskette, then new status messages are added to it.

The **result** file is an ordinary American Standard Code for Information Interchange (ASCII) text file. You can access the result file with the MS-DOS[®] **type** command as follows:

1. **Select QUIT to exit the diagnostics and return to the operating system prompt.**
2. **At the operating system prompt, type the appropriate command and press <ENTER>:**

```
type result
```

The contents of the file appear on the screen.

After running particular diagnostic tests and viewing the status messages generated by the tests in the **result** file, you can erase the contents of the file so that it is clear for the next set of messages generated. Otherwise, the next messages are added at the end of the previous ones in the file.

Output Device for Error Messages

Ordinarily, all error messages appear only on the screen. This parameter allows you to direct error messages to either a printer or a file, in addition to the screen. If you choose the **FILE** option, error messages are written to the **result** file used for status messages. This file is automatically created on a diskette in drive A when you run the diagnostics. If the **result** file already exists on the diskette, then new error messages are added to it.

The **result** file is an ordinary ASCII text file. You can access and review the **result** file with the MS-DOS **type** command as described in the previous subsection, “Output Device for Status Messages.”

After running particular diagnostic tests and viewing the error messages generated by the tests in the **result** file, you can erase the contents of the file so that it is clear for the next set of messages generated. Otherwise, the next messages are added at the end of the previous ones in the file.

Test Limits

NOTE: The diagnostics program sets default limits on all tests. The only reason to change the default would be to limit the amount of testing done.

The RAM Test Group, the Video Test Group, the Diskette Drives Test Group, the Hard-Disk Drives (Non-SCSI) Test Group, the Serial/Infrared Ports Test Group, the Parallel Ports Test Group, and the SCSI Devices Test Group allow you to designate limits. Whether you select **TEST LIMITS** for a highlighted test group (from the Main menu) or a subtest (from the Subtest menu), you set the limits for all the subtests in that test group. When you select **TEST LIMITS**, a new screen appears and the Key Help area lists keys to use with the new screen.

How you change a value for the limits of a test group or subtest depends on the type of parameter associated with it. Different keys are used to change values for different types of parameters. For example, memory address limits specified for the RAM Test Group are changed by typing in numbers over the digits of a given limit or by pressing the plus (+) or minus (–) keys to increase or decrease the given limit. In contrast, to set limits for the Serial/Infrared Ports Test Group, you use the <SPACEBAR> to toggle between **YES** and **NO**.

After you are satisfied with the limits, return to the main screen of the diagnostics by pressing the <ESC> key. The values you selected under **TEST LIMITS** remain in effect during all the test groups or subtests you run, unless you change them. However, the values are reset to their defaults when you restart the diagnostics.

About

ABOUT in the Main menu lists all of the subtests for the selected test group and displays information about the subtest that is highlighted.

Key-Help

KEY-HELP always displays a list of key controls available for the particular category you have selected.

Quit

Selecting **QUIT** from the Main menu exits the diagnostics and returns you to your operating system environment.

CAUTION: It is important that you quit the diagnostics program correctly because the program writes data to the computer's memory that can cause problems unless properly cleared.

Tests in the System Diagnostics

To troubleshoot components or devices, run the appropriate test (test group or subtest) in the diagnostics. The

diagnostics exercises the functional components and devices of the computer system more vigorously and thoroughly than they are exercised during normal operation. The diagnostics is organized by components into test groups and subtests within each test group. Each subtest is designed to detect any errors that may interfere with the normal operation of a specific device of the computer.

NOTE: Some subtests requiring hardware not listed in the System Configuration area of the diagnostics screen appear to run, but they conclude with a status message stating Component not present (or disabled).

Table 5-2 lists the diagnostic test groups, their subtests, and comments concerning their use.

Table 5-2. System Diagnostics Tests

Test Groups	Subtests	Description
RAM	Quick Memory Test Comprehensive Memory Test Cache Memory Test	Tests the system RAM and processor cache.
System Set	CMOS Confidence Test CMEM Confidence Test DMA Controller Test Real-Time Clock Test System Timers Test Interrupt Controller Test Reset Button Test System Speaker Test Coprocessor Calculation Test Coprocessor Duty Cycle Test Coprocessor Error Exception Test Multiprocessor Test	Tests the system board's support chips, DMA controller, computer timer, NVRAM, speaker controller, cache, and EISA configuration RAM chip, as appropriate. Tests the math coprocessor that is internal to the microprocessor. For systems with multiprocessors, confirms that the secondary microprocessor is operational.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 5-2. System Diagnostics Tests (Continued)

Test Groups	Subtests	Description
Video	Video Memory Test Video Hardware Test Text Mode Character Test Text Mode Color Test Text Mode Pages Test Graphics Mode Test Color Palettes Test Solid Colors Test	Tests the video subsystem and monitor by checking various aspects of video output.
Keyboard	Keyboard Controller Test Keyboard Key Sequence Test Keyboard Interactive Test Stuck Key Test External Key Pad Test	Tests the keyboard by checking the keyboard controller and by finding keys that stick or respond incorrectly.
Mouse	Mouse	Tests the electronic pointing device (bus mouse, serial mouse, trackball, or PS/2 mouse).
Diskette Drives	Change Line Test Seek Test Read Test Write Test	Tests a drive that uses removable diskettes. Also tests the associated interface.
Hard-Disk Drives (Non-SCSI)	Disk Controller Test Forced Error-Correction-Code Test Seek Test Read Test Write Test	Tests drives that use fixed, internal disks. Also tests the associated interface.
Serial/Infrared Ports	Serial/Infrared Baud Rate Test Serial/Infrared Interrupt Test Serial/Infrared Internal Transmission Test Serial External Transmission Test	Tests the components through which peripherals that use the serial or infrared ports, such as printers and communications devices, send and receive data.
Parallel Ports	Parallel Internal Test Parallel External Loopback Test Parallel External Interrupt Test Parallel Printer Pattern Test	Tests the components through which peripherals that use the parallel port, such as printers and communications devices, send and receive data.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table 5-2. System Diagnostics Tests (Continued)

Test Groups	Subtests	Description
SCSI Devices	Internal Diagnostic Seek Test Read Test Write Test Audio Output Test Eject Removable Media Display Information	Tests SCSI host adapters and all the SCSI devices attached to them. Also can be used to remove CDs and tape cartridges from SCSI devices and to display information about the types of SCSI devices installed and the resources allocated to them.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Error Messages

When you run a test group or subtest in the diagnostics, error messages may result. These particular error messages are not covered in this chapter because the errors that generate these messages can be resolved only with Dell technical assistance. Record the messages on a copy of the Diagnostics Checklist found in Appendix A, and see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance and informing the support technician of these messages.

RAM Test Group

The RAM Test Group subtests check all the directly addressable RAM.

Subtests

Three subtests are available for RAM: the Quick Memory Test, the Comprehensive Memory Test, and the Cache Memory Test. The Quick Memory Test performs an address check to determine whether the computer is properly setting and clearing individual bits in RAM and whether the RAM read and write operations are affecting more than one memory address location at one time.

This subtest checks all available RAM. The Comprehensive Memory Test also performs an address check, as well as the following:

- Data pattern checks, to look for RAM bits that are stuck high or low, short-circuited data lines, and some data pattern problems that are internal to the memory chips
- A parity check that verifies the ability of the memory subsystem to detect errors
- A refresh check, to verify that the dynamic RAM (DRAM) is being recharged properly

The Cache Memory Test confirms the functionality of the computer’s cache controller chip and the cache memory.

Why Run a RAM Test?

Faulty memory can cause a variety of problems that may not, at first glance, appear to be happening in RAM. If the computer is displaying one or more of the following symptoms, run the subtests in the RAM Test Group to verify that the memory is not at fault:

- A program is not running as usual, or a proven piece of software appears to malfunction and you confirm that the software itself is not at fault. (You can confirm that the software is functioning properly by moving it to another computer and running it there.)

- The computer periodically *locks up* (becomes unusable and must be rebooted), especially at different places and times in different programs.
- You get parity errors (any error message that contains the word *parity*) at any time during operation. These errors are usually accompanied by a reference to an *address*—the location of the portion of memory where the error occurred—which you should record on a copy of the Diagnostics Checklist found in Appendix A.
- You receive the Memory ECC fault detected message from the Dell Hardware Instrumentation Package (HIP) server management program. See Chapter 3, “Messages and Codes,” for more information on this program.

System Set Test Group

The subtests in the System Set Test Group check the computer’s basic system board components and verify their related functions.

Subtests

The subtests that constitute the System Set Test Group and the computer functions they confirm follow:

- **CMOS Confidence Test**
Checks the NVRAM for accessibility and reliability of data storage by performing a data pattern check and verifying the uniqueness of memory addresses.
- **CMEM Confidence Test**
Verifies the accessibility and reliability of the RAM on the Extended Industry-Standard Architecture (EISA) Configuration RAM chip, which stores the EISA hardware configuration information. On systems without flash RAM, performs a data pattern and address uniqueness test.
- **DMA Controller Test**
Tests the direct memory access (DMA) controller and verifies the correct operation of its page and channel registers by writing patterns to the registers.

- **Real-Time Clock Test**
Confirms the functionality and accuracy of the computer’s real-time clock (RTC).
- **System Timers Test**
Checks the timers used by the microprocessor for event counting, frequency generation, and other functions. Only the functions that can be activated by software are tested.
- **Interrupt Controller Test**
Generates an interrupt on each interrupt request (IRQ) line to verify that devices using that line can communicate with the microprocessor and that the interrupt controllers send the correct memory addresses to the microprocessor.
- **Reset Button Test**
Confirms that the reset button works.
- **System Speaker Test**
Checks the functionality of the speaker by generating eight tones.
- **Coprocessor Calculation Test**
Checks the use of different types of numbers and the math coprocessor’s ability to calculate correctly.
- **Coprocessor Duty Cycle Test**
Tests the math coprocessor’s ability to perform complex mathematical operations.
- **Coprocessor Error Exception Test**
Verifies the math coprocessor’s ability to handle errors and to send IRQs to the microprocessor.
- **Multiprocessor Test**
For systems with multiprocessors, confirms that the secondary microprocessor is operational.

Why Run a System Set Test?

The System Set subtests double-check many system board components, such as the computer’s input/output (I/O) circuitry, that are tested by other test groups or subtests in the diagnostics. You should run the System Set Test Group if you are having a problem and cannot isolate the failure or malfunction to a particular system board component.

The System Set Test Group also verifies the proper operation of other computer components, such as the speaker, that are not tested elsewhere in the diagnostics.

The following symptoms usually suggest a problem with a component or subassembly that warrants running a System Set subtest:

- A program is not running as usual, or a proven piece of software appears to malfunction and you confirm that the software itself is not at fault. (You can confirm that the software is functioning properly by moving it to another computer and running it there.)
- An option card you previously accessed can no longer be accessed.
- You get parity errors or page fault failures (any error message that contains the word *parity* or *page fault*) at any time during operation. These errors are usually accompanied by a reference to an address, which you should record on a copy of the Diagnostics Checklist found in Appendix A.
- Correcting errors in the system configuration information in the System Setup program does not resolve a problem.
- The computer's clock/calendar stops.
- The speaker no longer functions. The problem could be a failure of the system timers as well as a failure of the speaker itself. Run the System Timers Test, followed by the System Speaker Test.
- If a peripheral device appears to malfunction, run the Interrupt Controllers Test.
- A spreadsheet program or other type of mathematical application runs abnormally slow, generates error messages concerning calculations or operations, runs incorrectly, or generates incorrect results, or a proven piece of the program appears to malfunction and you confirm that the software itself is not at fault. (You can confirm that the software is not at fault by moving the program to another computer and running it there.)
- The computer periodically locks up, especially at different places and times in different programs.
- The computer halts in the middle of performing calculations or complex mathematical operations.

Video Test Group

The subtests in the Video Test Group verify the proper operation of the video controller and the video control circuitry installed in the computer. These subtests check for the correct operation of the readable registers in the video circuitry and the controller. They write, read, and verify data patterns in the cursor registers of the controller. The Video Test Group also tests all the video memory and provides additional subtests to test the color features of a color monitor.

Subtests

The eight subtests in the Video Test Group and the video functions they confirm follow:

- **Video Memory Test**
Checks the read/write capability of video memory in various video modes.
- **Video Hardware Test**
Checks the cursor registers and the horizontal and vertical retrace bit registers in the video controller.
- **Text Mode Character Test**
Checks the video subsystem's ability to present data in text modes.
- **Text Mode Color Test**
Checks the video subsystem's ability to present color in text modes.
- **Text Mode Pages Test**
Checks the video subsystem's ability to map and present all available video pages on the screen, one page at a time.
- **Graphics Mode Test**
Checks the video subsystem's ability to present data and color in graphics modes.
- **Color Palettes Test**
Checks the video subsystem's ability to display all of the available colors.
- **Solid Colors Test**
Checks the video subsystem's ability to show screens full of solid colors. Allows you to check for missing color subpixels.

Many of these tests display characters or graphics on the screen for you to verify. Samples of these screens are shown in Appendix B, “Diagnostic Video Tests.”

*NOTE: The default limit for testing super video graphics array (SVGA) modes is **NO**. If you are testing an external monitor, change the default to **YES**.*

Why Run a Video Test?

Many of the symptoms that would prompt you to run a subtest in the Video Test Group are obvious, because the monitor is the visual component of the computer system. Before you run the Video Test Group or any of its subtests, you should make sure that the problem is not in the software or caused by a hardware change. You should also try running all of the software support utilities provided for the monitor and the video subsystem.

If the following symptoms still occur, run the appropriate test(s) as follows:

- If the monitor shows a partially formed or distorted image, run *all* of the subtests in the Video Test Group.
- If the alignment of text or images is *off*, regardless of the program you are running, run the Text Mode Character Test, Text Mode Pages Test, and Graphics Mode Test.
- If you have a color monitor or a program that runs in color, but the color is intermittent or not displayed at all, run the Text Mode Color Test, Color Palettes Test, and Solid Color Test.
- If the monitor malfunctions in one mode but works fine in another (for example, text is displayed correctly, but graphics are not), run the Text Mode Character Test, Text Mode Color Test, Text Mode Pages Test, and Graphics Mode Test.

Keyboard Test Group

The subtests in the Keyboard Test Group verify the correct operation of the keyboard and the keyboard controller chip.

Subtests

The five keyboard subtests and the keyboard functions they confirm follow:

- **Keyboard Controller Test**
Confirms the ability of the keyboard controller chip to communicate with the keyboard and the programming of the controller chip
- **Keyboard Key Sequence Test**
Verifies that the keys on the keyboard function correctly when you press the keys in a predefined order
- **Keyboard Interactive Test**
Checks the internal microcode of the keyboard and the external interface of the keyboard controller chip for a malfunctioning key
- **Stuck Key Test**
Checks the internal microcode of the keyboard and the external interface of the keyboard controller chip for a repeating-key signal
- **External Key Pad Test**
Checks the contact beneath the key for an electrical impulse to ensure that the key is working properly

Why Run a Keyboard Test?

Keyboard problems are not always caused by the keyboard. For example, a complete lockup of the computer system, rendering the keyboard inoperable, is more likely caused elsewhere. There are three symptoms that are likely to be keyboard-related. Sometimes, the configuration of a program changes the function of a key or key combination. Likewise, key configuration programs can change a key's function. Because these programs are memory resident, you should be sure to clear them out of the computer's memory before running a subtest in the Keyboard Test Group. (Clear them from memory by rebooting the computer from the *Dell Server Assistant* CD.) When these possibilities have been eliminated, and if the following symptoms occur, you should run one or more of the subtests in the Keyboard Test Group:

- When you press a key, the character represented by that key appears repeatedly; the key seems to be stuck. Run the Stuck Key Test.

- When you press a key and the response is different from the usual response or the response you anticipated, the key contact may be damaged. Run the Keyboard Interactive Test.
- When a key does not work at all, run all of the subtests in the Keyboard Test Group.

Mouse Test

The Mouse Test checks the functionality of the mouse controller (which coordinates cursor movement on the screen with corresponding movement of the mouse or touch pad) and the operation of the mouse keys/touch pad.

Subtests

There are no subtests for the Mouse Test Group.

Why Run the Mouse Test?

Mouse or touch pad problems are as likely to originate in RAM as they are to be caused by a faulty mouse or touch pad. Three sources of RAM-related problems include the configuration of a program (which changes the function of the mouse or touch pad), memory-resident programs, and failure of a device driver (the software that controls the function of the mouse or touch pad). If these possibilities have been eliminated and the following symptoms persist, run the Mouse Test:

- When you press a mouse button or the touch pad, the function of the button (or touch pad) continues; that is, the button (or touch pad) seems to be stuck.
- If the response when you press a mouse button or the touch pad is different from the usual or anticipated response, the button (or touch pad) contact may be damaged.
- A mouse button or the touch pad does not work at all.
- The cursor does not respond on the screen in accordance with the movements you make with the mouse or touch pad.

Diskette Drives Test Group

The subtests in the Diskette Drives Test Group allow you to test both 5.25-inch and 3.5-inch diskette drives of all capacities.

Subtests

The four diskette drive subtests in the Diskette Drives Test Group and the drive functions they confirm follow:

- **Change Line Test**
Checks for bent pins on the diskette drive controller and for defective lines on the diskette cable
- **Seek Test**
Checks the drive's ability to search for a specified track on the diskette and to position its read/write heads to all tracks
- **Read Test**
Positions the read/write heads at each cylinder of the diskette for reading data and verifies that all tracks on the diskette can be read correctly
- **Write Test**
Positions the read/write heads at each cylinder of the diskette and verifies that all tracks on the diskette can be written to correctly

Why Run a Diskette Drives Test?

Very often, a diskette drive problem may first appear to be a diskette problem. A box of defective diskettes might produce faulty-drive error messages. The test results can be confusing, so Dell suggests running the subtests in the Diskette Drives Test Group more than once using diskettes from different sources.

Another possible cause of diskette drive problems is human error—typing a command in an incorrect form (usually called a *syntax* error). Be sure you have entered the command in the proper form.

When the diskette(s) and command syntax are eliminated as causes, the following symptoms usually suggest a drive problem and warrant running a subtest in the Diskette Drives Test Group:

- An error message appears on the screen stating that the computer cannot *read* from or *write* to a diskette.

- A diskette cannot be properly formatted, or format error messages appear on the screen.
- Data on diskettes is corrupted or lost; these problems may be intermittent.

Hard-Disk Drives (Non-SCSI) Test Group

The subtests in the Hard-Disk Drives (Non-SCSI) Test Group check the functionality of up to two hard-disk drives of any capacity. The subtests check the storage capability of a drive as well as the hard-disk drive controller (which affects the ability to read from and write to the drive). The subtests are for all hard-disk drive types except for SCSI drives.

NOTE: Because the Dell PowerEdge 4100 system supports only SCSI hard-disk drives, use the SCSI Devices Test Group (described in “SCSI Devices Test Group” found later in this chapter) to test any hard-disk drive installed in the computer.

Serial/Infrared Ports Test Group

The subtests in the Serial/Infrared Ports Test Group check the computer’s interface with external devices, such as a printer and a mouse, that are connected to the computer through a serial or infrared port. The subtests in this test group are not intended as a diagnostic test for the actual peripheral attached to each port.

NOTES: With certain modems installed, the subtests in the Serial/Infrared Ports Test Group may fail because the modem appears to the diagnostics as a serial or infrared port, but it cannot be tested as a serial or infrared port. If a modem is installed and one of the subtests in the Serial/Infrared Ports Test Group fails, remove the modem and run the diagnostic tests again.

If an external loopback connector is not attached to a serial or infrared port, the Serial External Transmission Test will fail for that port and the results of this test should therefore be ignored. An external modem connected to the port does not substitute for an external loopback connector.

Subtests

The four subtests in the Serial/Infrared Ports Test Group and the port functions they confirm follow:

- **Serial/Infrared Baud Rate Test**
Checks the baud rate generator in each serial communications chip against the computer’s clock
- **Serial/Infrared Interrupt Test**
Checks the serial port’s ability to send IRQs to the microprocessor
- **Serial/Infrared Internal Transmission Test**
Checks several internal functions of the serial port using the internal loopback mode of the serial communications chip
- **Serial External Transmission Test**
If a loopback device is attached, checks the line control bits of the serial port and sends a test pattern at several baud rates, checking the returned values

Why Run a Serial/Infrared Ports Test?

If the diagnostics does not recognize the computer’s serial or infrared ports, enter the System Setup program and check the **SERIAL/INFRARED PORT** category to see whether the port has been disabled. The subtests in the Serial/Infrared Ports Test Group cannot test a port unless it is enabled.

When a port is faulty, it may not be immediately evident that the port, and not the device connected to the port, is faulty. Instead, the peripheral (such as a printer or mouse) might behave erratically or not operate at all. If the external device is not properly installed through the software, it also may not function properly. Try operating the peripheral from different programs or through the operating system. If it still does not work, you can eliminate the software configuration as the cause of the problem.

Another possible cause for errors is the external device. Use the documentation that came with the peripheral to troubleshoot it and confirm that it is working properly. (Most printers have a self-test.)

After you eliminate incorrect system configuration information settings, peripheral malfunctions, and software errors as potential causes of port problems, you can

run the subtests in the Serial/Infrared Ports Test Group to check the hardware. Although the following symptoms can be caused by faulty peripherals or software errors, they might also suggest a port problem:

- If a peripheral works intermittently or produces intermittent errors, the port may be faulty.
- If the computer displays an error message that is related to the external device connected to a port, but corrections to the device do not resolve the error, run the appropriate subtest in the Serial/Infrared Ports Test Group.
- If the software and the diagnostics do not recognize that you have a serial or infrared port, you should check the **SERIAL/INFRARED PORT** category in the System Setup program, and if necessary, run the appropriate subtest in the Serial/Infrared Ports Test Group.

Parallel Ports Test Group

The subtests in the Parallel Ports Test Group check the computer's interface with external devices, such as a printer, that are connected to the computer through a parallel port. The subtests in this test group are not intended as a diagnostic test for the actual peripheral attached to each port. (The only exception is a printer, as described in the Parallel Internal Test.)

NOTE: If an external loopback connector is not attached to the parallel port, the Parallel External Loopback Test will fail for that port and the results of this test should therefore be ignored.

Subtests

The four subtests in the Parallel Ports Test Group and the port functions they confirm follow:

- **Parallel Internal Test**
Checks several internal functions of the parallel port
- **Parallel External Loopback Test**
Tests the functionality of the control lines through an external loopback connector, if an external loopback connector is available

- **Parallel External Interrupt Test**

Tests the parallel port's ability to generate interrupts from all possible sources, if an external loopback connector or printer is available

- **Parallel Printer Pattern Test**

Tests a printer and tests the parallel port's ability to send a pattern to the printer, if connected

Why Run a Parallel Ports Test?

If the diagnostics does not recognize the computer's parallel port, enter the System Setup program and check the **PARALLEL PORT** category to see if the port has been disabled. The subtests in the Parallel Ports Test Group cannot test a port unless it is enabled.

When a port is faulty, it may not be immediately evident that the port, and not the device connected to the port, is faulty. Instead, the peripheral (such as a printer) might behave erratically or not operate at all. If the external device is not properly installed through the software, it also may not function properly. Try operating the peripheral from different programs or through the operating system. If it still does not work, you can eliminate the software setup as the cause of the problem.

Another possible cause for errors is the external device. Use the documentation that came with the peripheral to troubleshoot it and confirm that it is working properly. (Most printers have a self-test.)

After you eliminate incorrect system configuration information settings, peripheral malfunctions, and software errors as potential causes of port problems, you can run the subtests in the Parallel Ports Test Group to check the hardware. Although the following symptoms can be caused by faulty peripherals or software errors, they might also suggest a port problem:

- If a peripheral works intermittently or produces intermittent errors, the port may be faulty.
- If the computer displays an error message that is related to the external device connected to a port, but corrections to the device do not resolve the error, run the appropriate subtest in the Parallel Ports Test Group.

- If the software and the diagnostics do not recognize that you have a parallel port, you should check the **PARALLEL PORT** category in the System Setup program, and if necessary, run the appropriate subtest in the Parallel Ports Test Group.

SCSI Devices Test Group

The subtests in the SCSI Devices Test Group check the functionality of up to four SCSI host adapters and all the SCSI devices attached to them.

NOTES: Before conducting these subtests on CD-ROM drives, insert a CD with audio and data tracks (such as a multimedia CD) into each CD-ROM drive. All of the subtests, except for the Audio Output Test, require a CD with data tracks. The Audio Output Test requires a CD with audio tracks.

If a CD-ROM drive is empty or if it contains a CD that does not have the required data or audio tracks (depending on the subtest[s] being conducted), the subtest(s) will fail.

Subtests

The seven subtests in the SCSI Devices Test Group and the drive functions they confirm follow:

- **Internal Diagnostic**
Causes the device to run its internal self-test.
- **Seek Test**
Checks the device's ability to search for a specified track on the device and to position its read/write heads to all tracks.
- **Read Test**
Positions the read/write heads at each block of the device for reading data and verifies that all tracks on the device can be read correctly.
- **Write Test**
Positions the read/write heads at each block of the device and verifies that all tracks on the device can be written to correctly.

- **Audio Output Test**

Causes the CD-ROM drive to begin playing the first audio track on an audio CD. To determine whether the test passed, listen to the audio output of the drive.

NOTE: To conduct the Audio Output Test, you must select it individually. It will not run as part of the test group.

- **Eject Removable Media**

Causes a CD-ROM drive to eject its CD or a SCSI tape drive to eject its tape cartridge.

- **Display Information**

Displays a screen of information about each SCSI host adapter in the computer, the resources allocated to each SCSI host adapter, and a list of target devices attached to the SCSI host adapter.

Why Run a SCSI Devices Test?

If you check the SCSI hard-disk drive to determine the amount of available space, the operating system will probably report problem areas. Problem areas on hard-disk drives are common, because most hard-disk drives have a small amount of space that is not usable. The hard-disk drive keeps a record of this space so that the computer will not attempt to use it. Identification of unusable disk space, unless it is an unusually large amount (over five percent of the possible total), should not be regarded as a cause for testing the hard-disk drive.

These are the most common symptoms that might prompt you to test a SCSI device:

- A SCSI hard-disk drive fails during the boot routine.
- *Seek* errors are reported by the operating system or application programs.
- An error message appears on the screen stating that the computer cannot read from or write to a SCSI device.
- Data on a SCSI device is corrupted or lost; this problem may be intermittent. Once saved by a program, files cannot be properly recalled.

Chapter 6

Checking the Equipment

This chapter provides troubleshooting procedures for equipment that connects directly to the input/output (I/O) panel of the computer, such as the monitor, keyboard, mouse, or printer. Before performing any of the procedures in this chapter, see “Checking Connections and Switches” in Chapter 2. Then perform the troubleshooting procedures for the equipment that is malfunctioning.

You need the following items to perform the procedures in this chapter:

- The *Dell Server Assistant* CD
- A blank, formatted diskette
- The system documentation

NOTE: When you see the question, “Is the problem resolved?” in a troubleshooting procedure, perform the operation that caused the problem.

Troubleshooting the Monitor

Troubleshooting video problems involves determining which of the following is the source of the problem:

- Monitor and monitor interface cable
- Video memory
- Video logic of the computer or a video expansion card

If information on the monitor screen is displayed incorrectly or not at all, complete the following steps to determine the problem:

1. **Turn on the system, including any attached peripherals.**
2. **Adjust the switches and controls as specified in the monitor’s documentation to correct the video**

image, including the horizontal and vertical position and size.

Is the problem resolved?

Yes. You have fixed the problem.

No. Go to step 3.

3. **Run the system diagnostics software.**

See Chapter 5, “Running the System Diagnostics.” Does the monitor display text properly?

Yes. Go to step 5.

No. Go to step 4.

4. **Type `g` and press the down-arrow key four times. Then press the plus (+) key to send all *error* messages to a printer. To send the error messages to a file named results on a diskette, insert a blank diskette into drive A, then press the plus (+) key twice to send the error messages to the file.**

5. **Run the Video Test Group in the system diagnostics.**

See Chapter 5, “Running the System Diagnostics.” Most of the tests in the Video Test Group require you to respond before the diagnostics continues with the next test.

Do the tests complete successfully?

Yes. You have fixed the problem.

No. Go to step 6.

6. **Turn off the system and disconnect it from alternating current (AC) power. Swap the monitor with one of the same type that is working, and reconnect the system to AC power.**

7. Run the Video Test Group in the system diagnostics again.

Do the tests complete successfully?

Yes. The monitor must be replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. If a video expansion card is installed in the computer, see “Troubleshooting Expansion Cards” in Chapter 7. If no video expansion card is installed, the built-in video controller is faulty. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting the Keyboard

This procedure determines what kind of keyboard problem you have. If a system error message indicates a keyboard problem when you start up the computer system or while the system diagnostics is running, complete the following steps:

1. Look at the keyboard and the keyboard cable for any signs of damage. Press and release each key on the keyboard.

Do the keyboard and its cable appear to be free of physical damage, and do the keys work?

Yes. Go to step 3.

No. Go to step 2.

2. Swap the faulty keyboard with a working keyboard.

To swap a faulty keyboard, unplug the keyboard cable from the computer’s back panel and plug in a working keyboard.

Is the problem resolved?

Yes. The keyboard must be replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 3.

3. Run the Keyboard Test Group in the system diagnostics.

See Chapter 5, “Running the System Diagnostics.”

Can you use the keyboard to select the Keyboard Test Group?

Yes. Go to step 4.

No. Go to step 5.

4. Does the Keyboard Interactive Test complete successfully?

Yes. Go to step 6.

No. Go to step 5.

5. Swap the faulty keyboard with a working keyboard.

6. Does the Keyboard Controller Test complete successfully?

Yes. The keyboard must be replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. The keyboard controller on the system board is faulty. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting I/O Ports

This section provides a procedure for troubleshooting the ports on the computer’s I/O panel and the equipment connected to them, such as a printer, scanner, or other peripheral device.

You can also use this procedure to test I/O ports on expansion cards. However, you should first complete the procedures in “Troubleshooting Expansion Cards” in Chapter 7 to verify that the card is configured and installed correctly.

If a system error message indicates a port problem or if equipment connected to a port seems to perform incorrectly or not at all, the source of the problem may be any of the following:

- A faulty connection between the I/O port and the peripheral device

- A faulty cable between the I/O port and the peripheral device
- A faulty peripheral device
- Incorrect settings in the System Setup program
- Incorrect settings in the system's configuration files
- Faulty I/O port logic on the system board

NOTE: With certain modems installed, subtests in the Serial Port Test Group may fail because the modem appears to the diagnostics as a serial port, but it cannot be tested as a serial port. If you have a modem installed and you experience a serial-port test failure, remove the modem and run the diagnostic tests again.

Troubleshooting the Basic I/O Functions

This procedure determines whether the computer's basic I/O functions are operational. If a system error message indicates an I/O port problem or the device connected to the port does not function properly, follow these steps:

- 1. Enter the System Setup program, and check the settings for the SERIAL PORT 1, SERIAL PORT 2, PARALLEL PORT, and MOUSE categories.**
Are the communications port categories set to **AUTO**, and is the **MOUSE** category set to **ENABLED**?
Yes. Go to step 3.
No. Go to step 2.
- 2. Change the setting for the SERIAL PORT 1, SERIAL PORT 2, and PARALLEL PORT categories to AUTO, and change the setting for the MOUSE category to ENABLED; then reboot the system.**
Is the problem resolved?
Yes. You have fixed the problem.
No. Go to step 3.

3. Check the contents of the start-up files.

See "Installing and Configuring Software" in Chapter 4.

Are the port configuration commands correct?

Yes. Go to step 5.

No. Go to step 4.

4. Change the necessary statements in the start-up files.

If the port problem is confined to a particular application program, see the application program's documentation for specific port configuration requirements.

Is the problem resolved?

Yes. You have fixed the problem.

No. Go to step 5.

5. Reboot the system from the Dell Server Assistant CD, and run the Serial Port Test Group and/or the Parallel Port Test Group in the system diagnostics.

See Chapter 5, "Running the System Diagnostics."

The Serial Port Test Group and the Parallel Port Test Group test the basic functions of the system board's I/O port logic. Also, if a parallel printer is connected to the parallel port, the Parallel Port Test Group tests the communications link between the system board's I/O port logic and the printer.

Do the tests complete successfully?

Yes. Go to step 6.

No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

6. If the problem persists, go to "Troubleshooting a Parallel Printer" or "Troubleshooting a Serial I/O Device" found later in this chapter, depending on which device appears to be malfunctioning.

Troubleshooting a Parallel Printer

If the procedure in the preceding subsection, “Troubleshooting the Basic I/O Functions,” indicates that the problem is with a parallel printer, follow these steps:

1. **Turn off the parallel printer and computer.**
2. **Swap the parallel-printer interface cable with a known working cable.**
3. **Turn on the parallel printer and computer.**
4. **Attempt a print operation on the parallel printer.**

Does the print operation complete successfully?

Yes. The interface cable must be replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 5.

5. **Run the parallel printer’s self-test.**

Does the self-test complete successfully?

Yes. Go to step 6.

No. The printer is probably defective. If the printer was purchased from Dell, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

6. **Attempt another print operation on the parallel printer.**

Does the print operation complete successfully?

Yes. You have fixed the problem.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting a Serial I/O Device

If the procedure in the preceding subsection, “Troubleshooting the Basic I/O Functions,” indicates that the problem is with a device connected to one of the serial ports, follow these steps:

1. **Turn off the computer and any peripheral devices connected to the serial ports.**

Are two serial devices connected to the computer?

Yes. Go to step 2.

No. Go to step 4.

2. **Disconnect the devices from serial ports 1 and 2, and connect the malfunctioning serial device to the opposite port.**

3. **Turn on the computer and the reconnected serial device.**

Is the problem resolved?

Yes. The serial port may be defective. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 4.

4. **Turn off the computer and the serial device, and swap the interface cable (that connects the device to the serial port) with a known working cable.**

5. **Turn on the computer and the serial device.**

Is the problem resolved?

Yes. The interface cable must be replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 6.

6. **Turn off the computer and the serial device, and swap the device with a comparable working device.**

For example, if the serial mouse has a problem, swap it with a serial mouse that you know is working properly.

7. **Turn on the computer and the serial device.**

Is the problem resolved?

Yes. The serial device must be replaced. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Chapter 7

Checking Inside the Computer

This chapter provides troubleshooting procedures for components inside the computer. Before you start any of the procedures in this chapter, do the following:

- Perform the procedures described in “Checking Connections and Switches” and “The System Setup Program” in Chapter 2.
- Read the safety instructions in “Safety First—For You and the Computer” found next in this chapter.

You need the following items to perform the procedures in this chapter:

- The *Dell Server Assistant* CD
- The system documentation
- A #1 Phillips-head screwdriver (or 1/4-inch hex-nut driver)
- The key to the system keylocks

NOTE: When you see the question, “Is the problem resolved?” in a troubleshooting procedure, perform the operation that caused the problem.

Safety First—For You and the Computer

The procedures in this chapter require that you remove the covers and work inside the computer. While working inside the computer, do not attempt to service the computer except as explained in this guide and elsewhere in Dell documentation. Always follow the instructions closely.

Working inside the computer is safe—if you observe the following precautions.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before starting to work on the computer, perform the following steps in the sequence indicated:

1. **Turn off** the computer and all peripherals.
2. **Disconnect** the computer and peripherals from their power sources. Doing so reduces the potential for personal injury or shock.
3. **Touch** an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside the computer.

While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

In addition, Dell recommends that you periodically review the safety instructions at the front of this guide.

Removing and Replacing the Computer Covers

To troubleshoot problems inside the computer, you need to remove one or both of the computer covers.

Removing the Computer Covers

Use the following procedure to remove the computer covers:

1. Observe the *Warning for Your Personal Safety and Protection of the Equipment* described earlier in this chapter. Also observe the safety instructions at the front of this guide.
2. To remove a computer cover, turn the cover's keylocks on the back panel of the computer (see Figure 7-1) to the unlocked position.
3. Loosen the three screws along the back edge of the cover (see Figure 7-2).
4. Slide the cover forward an inch or so, grasp the top of the cover at both ends, and lift it straight away from the chassis.

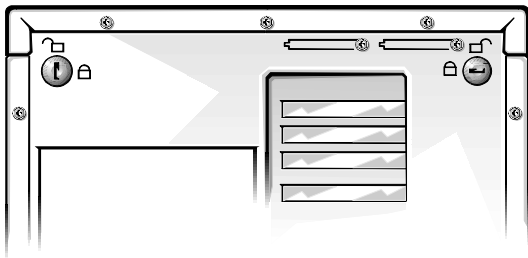


Figure 7-1. Keylocks on the Computer's Back Panel

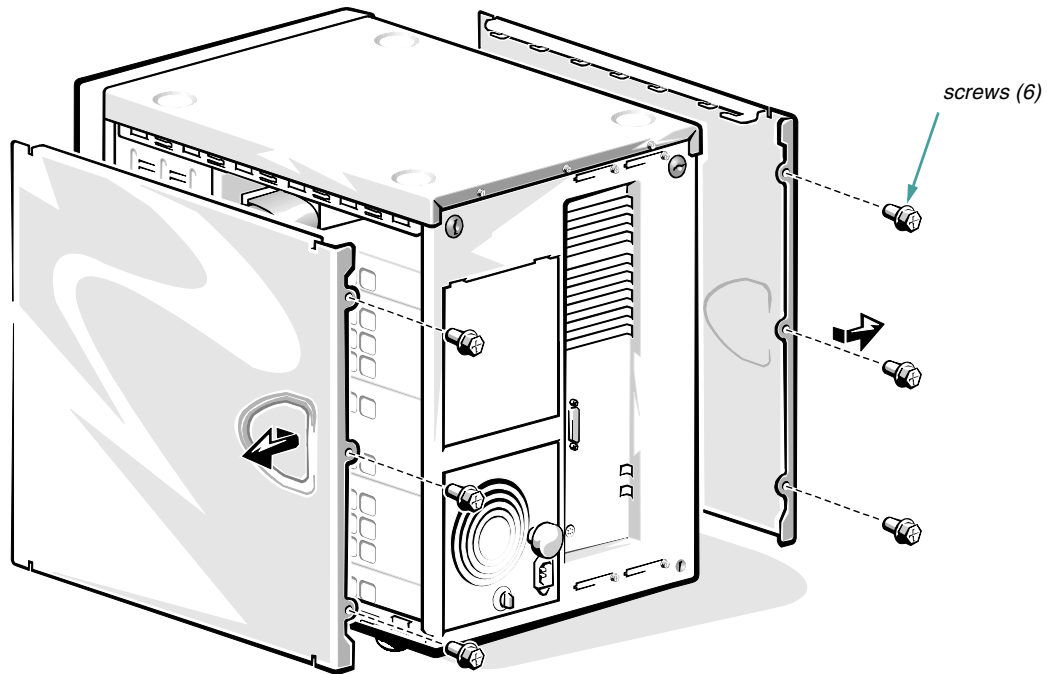


Figure 7-2. Removing the Computer Covers

Replacing the Computer Covers

Use the following procedure to replace a computer cover:

1. Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover.

CAUTION: Make sure that there are no cables or cable connectors lying on the top diskette drive in the upper drive cage. Foreign objects on top of the drive can interfere with drive operation and permanently damage the drive.

2. Check that no tools or extra parts (including screws) are left inside the computer.
3. Make sure the keylock is in the unlocked position.
4. Fit the cover over the side rail at the bottom of the chassis, and slide it closed.
5. Secure the cover with the three screws.
6. Set the keylock to the locked position.

Removing the Front Bezel

Use the following procedure to remove the front bezel:

1. **Remove the computer covers.**
See the previous subsection, “Removing the Computer Covers.”
2. **Release the two tabs on each side of the bezel.**
3. **Slide the front bezel straight forward.**

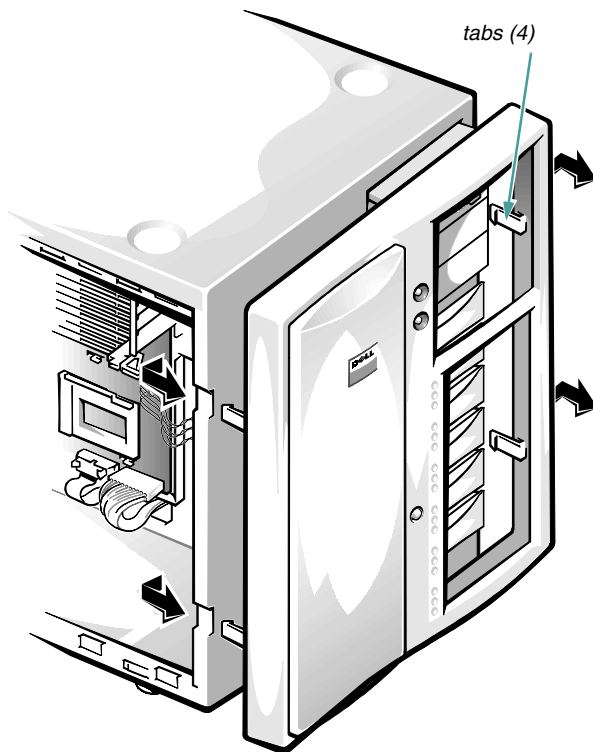


Figure 7-3. Removing the Front Bezel

Inside the Chassis

In Figures 7-4 and 7-5, the computer cover is removed to provide interior views from the left and right sides. These illustrations also identify features on the front and back of the computer. Refer to them to locate interior features and components discussed later in this guide.

When you look inside the computer, note the *direct current (DC) power cables* leading from the power supply or optional power-supply paralleling board. These cables supply power to the system board, small computer system interface (SCSI) backplane board, externally accessible drives, and certain expansion cards that connect to external peripherals.

The flat ribbon cables are the *interface cables* for internal drives. For non-SCSI drives, an interface cable connects each drive to an interface connector on the system board or on an expansion card. For SCSI devices, two interface cables connect externally accessible SCSI devices and the SCSI backplane board to a SCSI host adapter either on the system board or on an expansion card.

The *system board*—the large, vertical printed circuit board at the left side of the chassis near the back—holds the computer’s control circuitry and other electronic components. Some hardware options are installed directly onto the system board. The system board provides *eight expansion-card connectors*. The *external drive bays* provide space for up to four half-height drives, typically diskette drives, CD-ROM drives, or tape drives. The internal drive bays provide space for up to six half-height SCSI hard-disk drives. These drives are connected to the SCSI host adapter via the *SCSI backplane board*, which manages the drive bays and monitors the drive environment, including voltages and temperatures.

During an installation or troubleshooting procedure, you may be required to change a *jumper* or *switch* setting on the system board, an expansion card, or a drive. For information on the system board jumpers, see Appendix C, “Jumpers and Switches.”

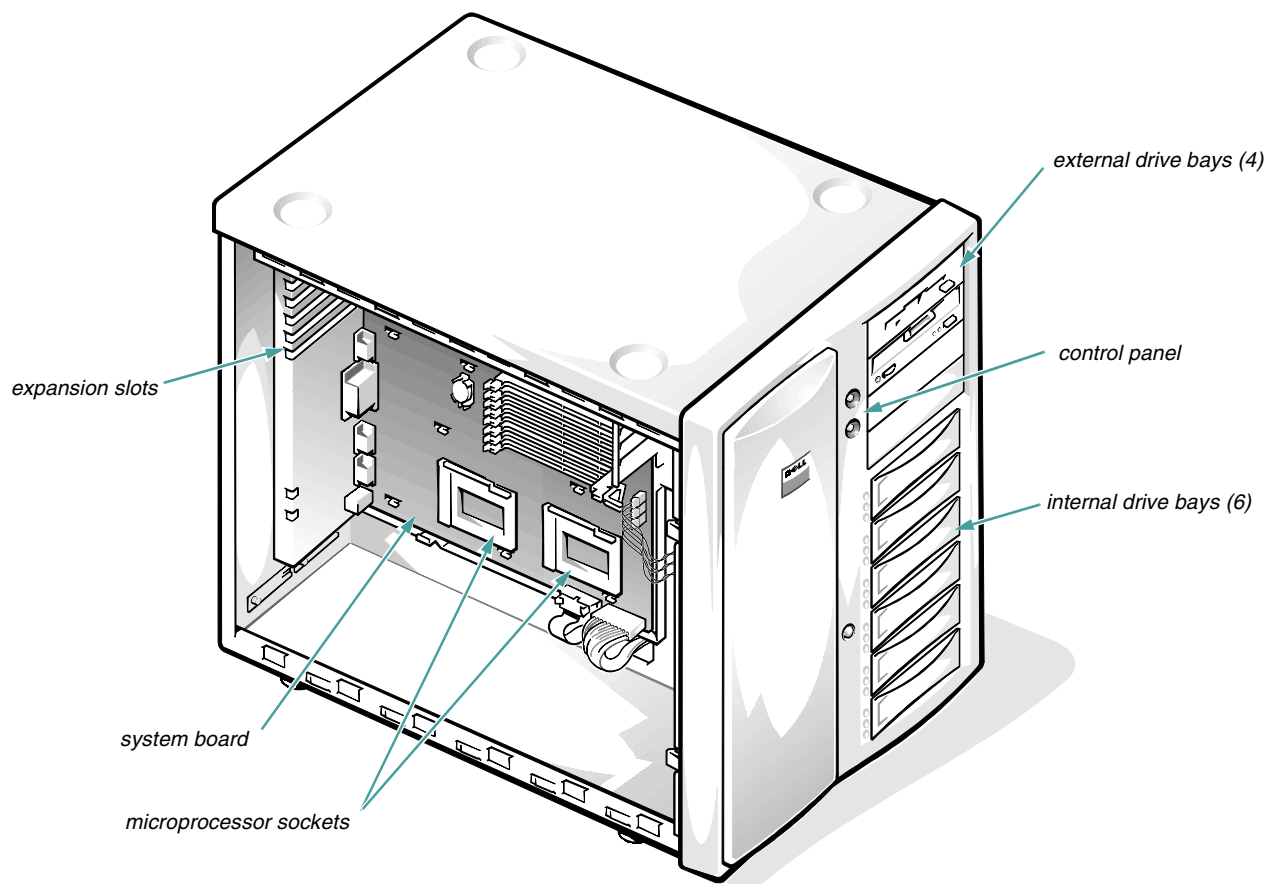


Figure 7-4. Inside the Chassis—Front/Left Side View

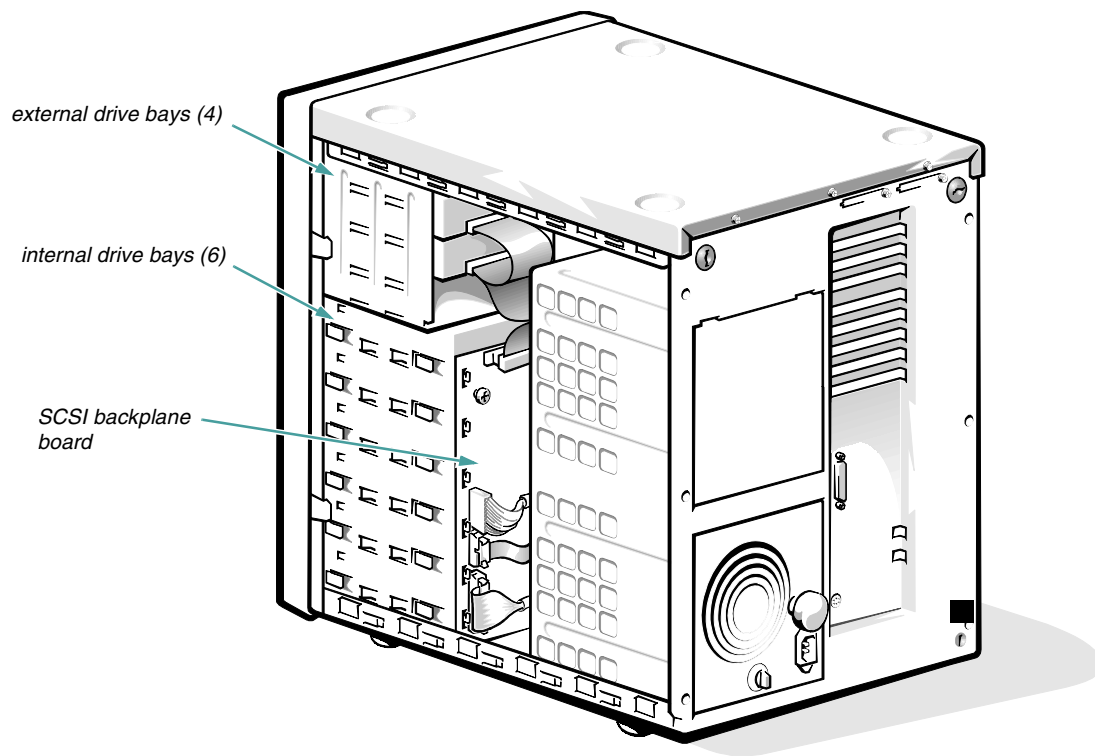


Figure 7-5. Inside the Chassis—Back/Right Side View

Responding to a Dell HIP Alert Message

The Dell Hardware Instrumentation Package (HIP) server management application program monitors critical system voltages and temperatures, the system cooling fans, and the status of the SCSI hard-disk drives in the computer. The program generates alert messages that appear in the simple network management protocol (SNMP) trap log file. (More information about the Alert Log window and options is provided in the Dell HIP online help and the Dell HIP *User's Guide*.)

Table 3-3 lists important HIP alert log messages, along with their probable causes and recommended actions.

Troubleshooting a Wet Computer

Liquid spills, splashes, and excessive humidity can cause damage to the system. If an external device (such as a printer or an external drive) gets wet, contact the manufacturer for instructions. If the computer gets wet, complete the following steps:

1. **Turn off the system, including any attached peripherals, and disconnect all the alternating current (AC) power cables from their power sources.**

2. Remove the computer covers.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

See “Removing the Computer Covers” found earlier in this chapter.

3. Let the computer dry for at least 24 hours.

Make sure that it is thoroughly dry before proceeding.

4. Remove all expansion cards installed in the computer.

5. Replace the computer covers, reconnect the system to AC power, and turn it on.

Does the system have power?

Yes. Go to step 6.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

6. Turn off the system, disconnect it from AC power, remove the left computer cover, and reinstall all expansion cards you removed in step 4.

7. Replace the computer cover, and reconnect the system to AC power.

8. Run the System Set Test Group in the system diagnostics.

See Chapter 5, “Running the System Diagnostics.”

Do the tests complete successfully?

Yes. The system is operating properly.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting a Damaged Computer

If the computer was dropped or damaged, you should check the computer to see if it functions properly. If an external device attached to the computer is dropped or damaged, contact the manufacturer of the device for

instructions or see Chapter 11, “Getting Help,” for information on obtaining technical assistance from Dell. Follow these steps to troubleshoot a damaged computer:

1. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.

2. Remove the left computer cover.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

See “Removing the Computer Covers” found earlier in this chapter.

3. Check all the board and card connections in the computer.

Check the following connections:

- Expansion-card connections to the system board
- Drive carrier connections to the SCSI backplane board

4. Verify all internal cable and component connections.

Make sure that all cables are properly connected and that all components are properly seated in their connectors and sockets.

5. Replace the left computer cover and reconnect the system to AC power.

6. Run the System Set Test Group in the system diagnostics.

See Chapter 5, “Running the System Diagnostics.”

Do the tests complete successfully?

Yes. The system is operating properly.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting the Battery

If an error message indicates a problem with the battery or if the System Setup program loses the system

configuration information when the computer is turned off, the battery may be defective.

Follow these steps to troubleshoot the battery:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**
2. **Remove the left computer cover.**

See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. **Check the connection of the coin cell battery to the system board.**

Is the battery firmly installed in the battery socket on the system board?

Yes. Go to step 5.

No. Go to step 4.

4. **Reseat the battery in its socket.**

Is the problem resolved?

Yes. The battery was loose. You have fixed the problem.

No. Go to step 5.

5. **Replace the battery.**

See “Replacing the Battery” in Chapter 8 for instructions on replacing the battery.

Is the problem resolved?

Yes. The battery’s charge was low. You have fixed the problem.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting Power Supply Problems

The optional redundant power supplies in Dell PowerEdge 4100 systems are controlled by the power-supply paralleling board. If a power-supply paralleling board is installed, the two light-emitting diodes (LEDs) on the back of the power supply (see Figure 7-6) signal the status of the power supply. If the red power-supply fault indicator lights up, the power supply should be replaced.

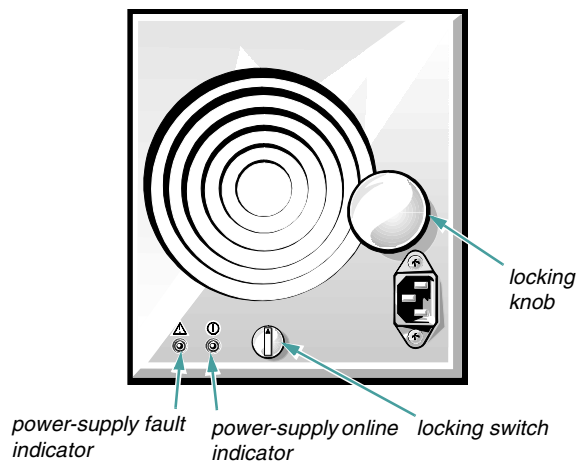


Figure 7-6. Power Supply Features

Replacing a Power Supply

Follow these steps to replace a power supply:

1. **Disconnect the AC power cable from the power outlet, then disconnect the other end of the cable from the power supply.**
Open the plastic strain-relief clip and remove the AC power cable.
2. **Turn the rotary switch on the power supply to the “off” position, marked by a “0.”**
3. **Turn the locking knob counterclockwise to release the power supply.**

- Slide the power supply out of the chassis (see Figure 7-7).

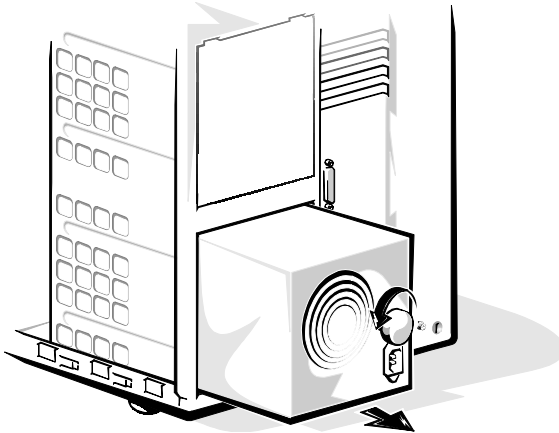


Figure 7-7. Removing the Power Supply

- Check that the locking switch on the new power supply is set to the “off” position, then slide the power supply into the chassis.
- Turn the locking knob clockwise until the replacement power supply is secured in the chassis.
- Connect the AC power cable to the power supply and to the power outlet.

Make sure that the AC power cable passes through the plastic strain-relief clip.

- Turn the locking switch on the power supply to the “on” position, marked by an “I.”

If an optional power-supply paralleling board is installed, the green online indicator on the power supply should light up.

Troubleshooting Power Cable Connections

- Check the AC power outlet and power cable (see “Checking Connections and Switches” in Chapter 2).
- Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.
- Remove the computer covers.
See “Removing the Computer Covers” found earlier in this chapter.
- Check the cable connections listed in Table 7-1.

Table 7-1. Power Cable Connectors on the Optional Power-Supply Paralleling Board

Connector	Cable Connection
PWR1	To POWER1 connector on system board
PWR2	To POWER2 connector on system board
PWR3	To POWER3 connector on system board
PWRFD	To diskette drives and other devices in external drive bays
PWRSCSI	To POWER connector on SCSI backplane

Troubleshooting a Cooling Fan

Three cooling fans are installed in the Dell PowerEdge 4100 system. Two fans are used to cool the computer; the third cooling fan does not operate unless one of the other two fans fails. If you observe that only one of the three redundant cooling fans is operating, or the Dell HIP server-management application program issues a fan-related error message, replace the fan as described in the following subsection.

Replacing a Cooling Fan

Follow these steps to replace a defective cooling fan.

WARNING: Only trained service technicians should perform this procedure. Do not remove the left computer cover with the power on unless you are replacing a cooling fan. (Never remove the right computer cover with the computer power on. There are high voltages in this area that can cause bodily harm.)

Do not touch or attempt to service any components other than the cooling fan. Other components could be damaged if you attempt to service them with the computer power on.

1. Remove the left computer cover.

See “Removing the Computer Covers” found earlier in this chapter.

2. Identify the defective cooling fan.

3. Disconnect the cooling fan’s power cable from the FAN connector on the system board.

4. Depress the catch on the fan carrier (see Figure 7-8) and remove the fan carrier from the chassis.

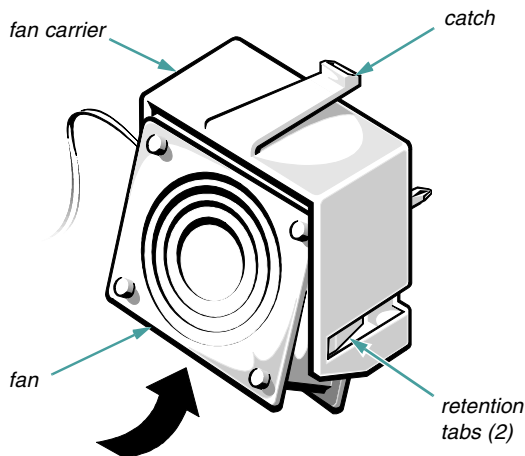


Figure 7-8. Replacing a Cooling Fan

5. Remove the cooling fan from the fan carrier by releasing the two fan retention tabs inside the carrier (see Figure 7-8).

6. Insert the replacement cooling fan in the carrier, and snap the two fan retention tabs back into position.

Orient the fan so that the power cable is at the upper-right corner of the carrier.

7. Reinstall the fan carrier in the computer.

Insert the two tabs along the lower edge of the fan carrier into the valences in the chassis, then raise the fan carrier into position until the catch on the fan carrier snaps into place in the computer chassis.

8. Connect the cooling-fan power cable to the FAN connector on the system board.

The fan should begin running.

9. Replace the left computer cover.

Troubleshooting Expansion Cards

If an error message indicates an expansion-card problem or if an expansion card seems to perform incorrectly or not at all, the problem could be a faulty connection, a conflict with software or other hardware, or a faulty expansion card. Follow these steps to troubleshoot expansion cards:

1. Start the EISA Configuration Utility, and verify that all Extended Industry-Standard Architecture (EISA) and Industry-Standard Architecture (ISA) expansion cards have been configured correctly. Save the configuration before exiting the utility.

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

2. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.

3. Remove the left computer cover.

See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

4. Verify that each expansion card is firmly seated in its connector.

Are the expansion cards properly seated in their connectors?

Yes. Go to step 6.

No. Go to step 5.

5. Reseat the expansion cards in their connectors.

See “Removing an Expansion Card” and “Installing an Expansion Card” in Chapter 8 for instructions on removing and replacing expansion cards.

Is the problem resolved?

Yes. The connection was loose. You have fixed the problem.

No. Go to step 6.

6. Verify that the appropriate cables are firmly connected to their corresponding connectors on the expansion cards.

For instructions on which cables should be attached to specific connectors on an expansion card, see the expansion card’s documentation.

Are the appropriate cables firmly attached to their connectors?

Yes. Go to step 8.

No. Go to step 7.

7. Reconnect the cable connectors to the appropriate connectors on the expansion cards.

Is the problem resolved?

Yes. The cable connections were loose. You have fixed the problem.

No. Go to step 8.

8. Inspect all jumpers and configuration switches on each expansion card.

Most ISA expansion cards have configuration settings for an interrupt request (IRQ) line, a direct memory access (DMA) channel, and a base-memory or basic input/output system (BIOS) address. To keep expansion cards from conflicting with each other, you need to know both the starting memory address and the amount of memory required by each card. For instructions on jumpers and configuration settings, see the expansion card’s documentation.

Is each expansion card configured correctly?

Yes. Go to step 10.

No. Go to step 9.

9. Reconfigure the card according to the instructions in the card’s documentation.

Is the problem resolved?

Yes. The memory configuration of the card was incorrect. You have fixed the problem.

No. Go to step 10.

10. Inspect all configuration jumpers on the system board to ensure that they are configured correctly for any installed expansion cards.

For information on the configuration jumpers and their settings, see Appendix C, “Jumpers and Switches.”

Are the system board’s configuration jumpers set correctly?

Yes. Go to step 12.

No. Go to step 11.

11. Correct the system board’s configuration jumper settings.

Is the problem resolved?

Yes. You have fixed the problem.

No. Go to step 12.

12. Remove all expansion cards except the hard-disk drive controller card (if one is installed).

See “Removing an Expansion Card” in Chapter 8 for information on removing expansion cards.

13. **Replace the left computer cover, reconnect the system to AC power, and turn it on.**
14. **Enter the System Setup program, and update the system configuration information.**

See Chapter 4, “Using the System Setup Program,” in the *User’s Guide* for instructions.

For any EISA and ISA expansion cards, enter the EISA Configuration Utility, and update the configuration information.

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

15. **Run the RAM Test Group in the system diagnostics.**

See Chapter 5, “Running the System Diagnostics.”

Do the tests complete successfully?

Yes. Go to step 17.

No. See Chapter 11, “Getting Help,” for information on obtaining technical assistance.

16. **Turn off the system, disconnect it from AC power, and remove the left computer cover.**
17. **Reinstall one of the expansion cards you removed in step 12, and repeat steps 13 through 15.**
18. **Run the RAM Test Group in the system diagnostics.**

Do the tests complete successfully?

Yes. Go to step 20.

No. See Chapter 11, “Getting Help,” for information on obtaining technical assistance.

19. **Repeat steps 17 through 19 for each of the remaining expansion cards that you removed in step 12.**

Have you reinstalled all of the expansion cards without encountering a test failure?

Yes. You have fixed the problem.

No. See Chapter 11, “Getting Help,” for information on obtaining technical assistance.

Troubleshooting System Memory

A system memory problem can be a faulty dual in-line memory module (DIMM) or a faulty system board. If a random-access memory (RAM) error message appears, the system probably has a memory problem.

When you turn on or reboot the system, the Caps Lock and Scroll Lock indicators on the keyboard should flash momentarily and then turn off. If the **NUM LOCK** category in the System Setup program is set to **ON**, the Num Lock indicator should flash momentarily and then remain on; otherwise, it should turn off. Abnormal operation of these indicators can result from a defective DIMM in socket DIMM A. Follow these steps to troubleshoot system memory:

1. **Turn on the system, including any attached peripherals.**

Does an error message appear indicating invalid system configuration information after the memory count completes?

Yes. Go to step 2.

No. Go to step 8.

2. **Enter the System Setup program to check the TOTAL MEMORY or SYSTEM MEMORY category.**

See Chapter 4, “Using the System Setup Program,” in the *User’s Guide* for instructions.

Does the amount of memory installed match the **TOTAL MEMORY** or **SYSTEM MEMORY** setting?

Yes. Go to step 8.

No. Go to step 3.

3. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

4. **Remove the left computer cover.**

See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

5. Reseat the DIMMs in their sockets.

See “Adding Memory” in Chapter 8 for instructions on removing and replacing DIMMs.

6. Replace the computer cover, reconnect the system to AC power, and turn it on.

7. Enter the System Setup program and check the TOTAL MEMORY or SYSTEM MEMORY category again.

Does the amount of memory installed match the **TOTAL MEMORY** or **SYSTEM MEMORY** setting?

Yes. Go to step 8.

No. Go to step 9.

8. Reboot the system, and observe the monitor screen and the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard.

Does the monitor screen remain blank, and do the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard remain on?

Yes. Go to step 9.

No. Go to step 11.

9. Turn off the system, disconnect it from AC power, and remove the left computer cover.

10. If possible, swap the DIMM in socket DIMM A with one of the same capacity, reboot the system, and observe the monitor screen and the indicators on the keyboard.

Is the problem resolved?

Yes. You have fixed the problem.

No. Go to step 11.

11. Run the RAM Test Group in the system diagnostics.

See Chapter 5, “Running the System Diagnostics.”

Do the tests complete successfully?

Yes. You have fixed the problem.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting the Video Subsystem

Troubleshooting video problems involves determining which of the following is the source of the problem: the monitor, the monitor interface cable, the video memory, or the video logic of the computer. You can also have a high-resolution video expansion card installed, which overrides the video logic of the computer.

The following procedure troubleshoots problems with the video memory and video logic only. Before you begin, perform the procedure found in “Troubleshooting the Monitor” in Chapter 6 to determine whether or not the monitor is the source of the problem.

If you have a high-resolution video expansion card, first complete the steps in “Troubleshooting Expansion Cards” found earlier in this chapter to verify that the card is configured and installed correctly.

Follow these steps to troubleshoot the video subsystem:

1. Run the Video Test Group in the system diagnostics.

See Chapter 5, “Running the System Diagnostics.”

Most of the tests in the Video Test Group are interactive; that is, you must respond before the diagnostics continues with the next test.

Do the tests complete successfully?

Yes. It is not a video hardware problem. Go to Chapter 4, “Finding Software Solutions.”

No. Go to step 2.

2. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.

3. Remove the left computer cover.

See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

4. Check the system-board configuration jumpers.

See Table C-1 for a list of the system board jumpers and their settings.

Is the on-board video jumper set correctly?

Yes. Go to step 9.

No. Go to step 5.

5. Correct the configuration jumper setting on the system board.

6. Replace the left computer cover, and reconnect the system to AC power.

7. Run the Video Test Group again.

Is the problem resolved?

Yes. The on-board video jumper was set incorrectly. You have fixed the problem.

No. Go to step 8.

8. Turn off the system, disconnect it from AC power, and remove the left computer cover.

9. Determine whether a video expansion card is installed.

Is a video expansion card installed?

Yes. Go to step 10.

No. The built-in video controller is faulty. Go to step 11.

10. Remove the video expansion card, and repeat steps 11 and 12.

Do the tests complete successfully?

Yes. The video expansion card is faulty. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 11.

11. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting the System Board

A system board problem can result from a defective system board component, a faulty power supply, or a defective component connected to the system board. If an error message indicates a system board problem, follow these steps to find the problem:

1. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.

2. Remove the left computer cover.

See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. Remove all expansion cards except the hard-disk drive controller card and the video expansion card (if they are installed).

4. Replace the left computer cover, reconnect the system to AC power, and turn it on.

5. For any EISA and ISA expansion cards, start the EISA Configuration Utility, and update the configuration information.

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

6. Enter the System Setup program, and update the system configuration information.

See Chapter 4, “Using the System Setup Program,” in the *User’s Guide* for instructions.

7. Run the System Set Test Group in the system diagnostics.

See Chapter 5, “Running the System Diagnostics.”

Do the tests complete successfully?

Yes. Go to step 8.

No. Go to step 12.

8. **Turn off the system, disconnect it from AC power, and remove the computer cover.**
9. **Reinstall one of the expansion cards you removed in step 3, and repeat steps 4 and 5.**
10. **Run the System Set Test Group again.**

Do the tests complete successfully?

Yes. Go to step 11.

No. Go to step 12.
11. **Repeat steps 8, 9, and 10 for each of the remaining expansion cards you removed in step 3.**

Have you reinstalled all of the expansion cards without encountering a test failure?

Yes. Go to step 12.

No. The expansion card is faulty. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.
12. **Disconnect the keyboard and reboot the system.**

Does the system boot successfully?

Yes. Go to step 13.

No. Go to step 14.
13. **Swap the keyboard with a comparable working keyboard, and run the System Set Test Group again.**

Do the tests complete successfully?

Yes. You have fixed the problem.

No. Go to step 14.
14. **See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.**

Troubleshooting the Diskette Drive Subsystem

If the monitor displays a system error message indicating a diskette drive problem during execution of either the

boot routine or the system diagnostics, the problem may be caused by any of the following conditions:

- The system configuration settings do not match the physical diskette subsystem configuration.
- The diskette drive cables are not properly connected or are faulty.
- An expansion card is interfering with proper drive operations.
- A diskette drive may be improperly configured.
- The diskette drive or tape drive is faulty.
- The computer’s power supply is not providing sufficient power for the drives.
- The computer’s diskette drive logic is faulty.

The troubleshooting procedures for the diskette drive subsystem are divided into the following subsections:

- “Checking the Diskette Drive Subsystem”
- “Troubleshooting the Diskette Drive Subsystem”
- “Troubleshooting a SCSI Tape Drive”

Before you begin the troubleshooting procedures, complete steps 1 and 2 in the next subsection, “Checking the Diskette Drive Subsystem,” to verify that the system configuration information is correct for the installed diskette drive(s).

If, after completing these steps, the system boots correctly and the monitor no longer displays a system error message, the problem is resolved. If you continue to have problems, however, proceed with the appropriate diskette drive subsystem troubleshooting procedure.

Checking the Diskette Drive Subsystem

To verify that the diskette drive subsystem is operating properly, follow these steps:

1. **Enter the System Setup program, and verify that the system is configured correctly for the DISKETTE DRIVE A and DISKETTE DRIVE B categories.**

See Chapter 4, “Using the System Setup Program,” in the system *User’s Guide* for instructions.

2. **If the system configuration settings are incorrect, make the necessary corrections in the System Setup program, and then reboot the system.**

3. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

See Chapter 5, “Running the System Diagnostics,” for more information.

Do the tests complete successfully?

Yes. Continue with the next step in the procedure you were performing.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Diskette-Drive Subsystem Troubleshooting

Follow these steps to troubleshoot the diskette drive subsystem:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

2. **Remove both computer covers.**

See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. **Check the diskette drive cabling.**

Is the diskette drive securely connected to the proper diskette drive interface cable connector? Is the diskette drive interface cable connector securely connected to the interface connector (labeled “FLOPPY”) on the system board? Is the drive’s DC power cable firmly connected to the drive?

Yes. Go to step 5.

No. Go to step 4.

4. **Reconnect the cable connectors.**

5. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

6. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

See Chapter 5, “Running the System Diagnostics,” for more information.

Do the tests complete successfully?

Yes. You have fixed the problem.

No. Go to step 7.

7. **Repeat steps 1 and 2, and remove all expansion cards.**

See “Expansion Cards” in Chapter 8 for instructions.

8. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

9. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

Do the tests complete successfully?

Yes. An expansion card may be conflicting with the diskette drive logic, or you may have a faulty expansion card. Go to “Checking the Diskette Drive Subsystem” found earlier in this chapter.

No. Go to step 10.

10. **Repeat steps 1 and 2, and reinstall one of the expansion cards you removed in step 7.**

See “Removing an Expansion Card” and “Installing an Expansion Card” in Chapter 8 for instructions.

11. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

12. **Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**

Do the tests complete successfully?

Yes. Go to step 13.

No. Go to step 14.

13. **Repeat steps 10 through 12 until all expansion cards have been reinstalled or until one of the expansion cards prevents the system from booting from the *Dell Server Assistant* CD.**

- 14. Repeat steps 1 and 2. Verify that the drive's terminator is installed and that the drive-select jumper is set to the DS1 position.**

NOTE: Some diskette drives may require you to remove the drive from the computer to access the terminator and drive-select jumper.

For information about the drive's terminator and drive-select jumper settings, refer to the documentation for the drive.

Is the drive configured correctly?

Yes. Go to step 18.

No. Go to step 15.

- 15. Correct the drive-select jumper setting and terminator installation.**
- 16. Replace the computer covers, reconnect the system to AC power, and turn on the system.**
- 17. Run the Diskette Drives Test Group in the system diagnostics to see whether the diskette drive subsystem now works correctly.**
- Do the tests complete successfully?
- Yes.* You have solved the problem.
- No.* Go to step 18.
- 18. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.**

Troubleshooting a SCSI Tape Drive

A SCSI tape drive can be installed in one of the externally accessible drive bays or an external device that attaches to a SCSI host adapter connector on the back panel of the computer. In either case, the SCSI tape drive is controlled by a SCSI host adapter installed in the computer, which may also control other SCSI devices connected to one or more SCSI cables. SCSI devices often require device drivers for the particular operating system being used by the computer system.

Tape drive problems often result from a defective tape drive, a defective tape cartridge, or software. Follow these steps to troubleshoot a SCSI tape drive:

- 1. Remove the tape that was in use when the problem occurred, and replace it with a tape that you know is not defective.**

Is the problem resolved?

Yes. The original tape was defective. Replace it with a new tape. You have fixed the problem.

No. Go to step 2.

- 2. Verify that any required SCSI device drivers are installed on the hard-disk drive and are configured correctly.**

See Chapter 3, "Installing and Configuring SCSI Drivers," in the system *User's Guide* for instructions on installing and configuring the SCSI device drivers for the system's built-in SCSI host adapter or Dell PowerEdge Expandable RAID Controller host adapter card. For any other type of SCSI host adapter card, see the documentation that accompanied the SCSI host adapter card.

Are the drivers installed and configured correctly?

Yes. The SCSI device drivers were installed or configured incorrectly or were corrupted. You have fixed the problem.

No. Go to step 3.

- 3. Reinstall the tape backup software as instructed in the tape-backup software documentation.**

Is the problem resolved?

Yes. The tape backup software was corrupted. You have fixed the problem.

No. Go to step 4.

- 4. Restart the system and check for the presence of the tape drive during the option read-only memory (ROM) scan sequence.**

Is the problem resolved?

Yes. The drive is correctly cabled and is receiving power. Go to step 9.

No. Go to step 5.

5. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.
6. Remove both computer covers.
See “Removing the Computer Covers” found earlier in this chapter.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

7. Check the SCSI cable connections to the tape drive and to the SCSI host adapter connector. If the tape drive is an internal device, check the DC power cable connection to the tape drive.
Are the cables firmly connected?
Yes. Go to step 9.
No. Go to step 8.
8. Reseat the cable connectors, replace the computer covers, reconnect the system to AC power, and turn it on.
Is the problem resolved?
Yes. You have fixed the problem.
No. Go to step 9.
9. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources. Then remove the right computer cover.
10. Remove the tape drive. Then verify that the tape drive is configured for a unique SCSI identification (ID) number and that the tape drive is terminated or not terminated as appropriate.
See the documentation for the tape drive for instructions on selecting the SCSI ID and enabling or disabling termination.
Is the tape drive configured correctly?
Yes. Go to step 13.
No. Go to step 11.
11. Reconfigure the tape drive’s SCSI ID and termination settings as appropriate. Reinstall the tape

drive, replace the computer covers, reconnect the system to AC power, and turn it on.

Is the problem resolved?

Yes. The tape drive was configured incorrectly. You have fixed the problem.

No. Go to step 12.

12. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources. Then remove the computer covers.

13. Replace the SCSI cable that connects the tape drive to the SCSI host adapter. Replace the computer covers, reconnect the system to AC power, and turn it on.

Is the problem resolved?

Yes. You have fixed the problem.

No. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Troubleshooting SCSI Hard-Disk Drives

Hard-disk drive problems can be caused by a number of conditions, including problems with the drive itself, the SCSI backplane board, or an interface cable.

Drive Indicator Error Codes

The SCSI backplane board monitors the internal SCSI hard-disk drives connected to the backplane board. In the event of a drive failure, systems using the optional Dell PowerEdge Expandable RAID Controller will issue the following signals using the drive indicator lights adjacent to each SCSI hard-disk drive:

- If a drive shows signs of imminent failure, the drive online indicator turns off and the drive fault indicator blinks on briefly each second.
- If a drive has failed, the drive online indicator turns off and the drive fault indicator blinks off briefly each second.

Other drive indicator patterns are listed in “SCSI Hard-Disk Drive Indicator Codes” in Chapter 3.

SCSI Hard-Disk Drive Troubleshooting

Use the following procedure to troubleshoot a hard-disk drive problem.

CAUTION: This troubleshooting procedure can destroy data stored on the hard-disk drive. Before you proceed, make sure you have backed up all the files on the hard-disk drive.

1. If the on-board SCSI host adapter is being used to control the SCSI backplane board, restart the system and press <F2> to enter the System Setup program.

Is the **ON-BOARD SCSI A** category set to **ENABLED**?

Yes. Go to step 3.

No. Go to step 2.

2. Change the **ON-BOARD SCSI A** category to **ENABLED**, and reboot the system.

Is the problem resolved?

Yes. You have fixed the problem.

No. Go to step 3.

3. Verify that the SCSI device drivers are installed and configured correctly.

See Chapter 3, “Installing and Configuring SCSI Drivers,” in the system *User’s Guide* to determine which drivers are required and how they should be installed and configured.

Are the required SCSI device drivers installed and configured correctly?

Yes. Go to step 5.

No. Go to step 4.

4. Reinstall and/or reconfigure the required SCSI device drivers. Then reboot the system.

Is the problem resolved?

Yes. You have fixed the problem.

No. Go to step 5.

5. Remove the drive carrier from its bay, and check the cable connections between the drive and the drive carrier. Reinstall the drive.

Is the problem resolved?

Yes. The drive carrier was not firmly seated in the connector on the SCSI backplane board, or the cable in the drive carrier was installed incorrectly. You have fixed the problem.

No. Go to step 6.

6. Remove the drive carrier and install it in another drive bay.

Is the problem resolved?

Yes. The SCSI backplane board has a defective connector. See Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

No. Go to step 7.

7. Remove the computer covers.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

8. Check the SCSI cable connections to the SCSI backplane board and to the SCSI host adapter. Check the DC power cable connection to the SCSI backplane board.

The SCSI cable may be connected to the SCSI host adapter on the system board, or to a SCSI host adapter card in an expansion slot. See Chapter 10, “Installing Drives in the Internal Bays,” for the location of the cable connectors on the SCSI backplane board and the SCSI host adapter.

Are the cables firmly connected?

Yes. Go to step 10.

No. Go to step 9.

- 9. Reseat the cable connectors, reconnect the computer and peripherals to their AC power sources, and turn them on.**

Is the problem resolved?

Yes. The cable connections were faulty. You have fixed the problem.

No. Go to step 10.

- 10. Partition and logically format the hard-disk drive. If possible, restore the files to the drive.**

To partition and logically format the drive, see the documentation for the computer's operating system.

Is the problem resolved?

Yes. The hard-disk drive format was corrupted. You have fixed the problem.

No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Chapter 8

Installing System Board Options

This chapter describes how to install the following options:

- Extended Industry-Standard Architecture (EISA), Industry-Standard Architecture (ISA), and Peripheral Component Interconnect (PCI) expansion cards

- Memory upgrades
- Microprocessor upgrades

This chapter also includes instructions for replacing the system battery, if necessary.

Use Figure 8-1 to locate the system board features mentioned in this chapter and elsewhere.

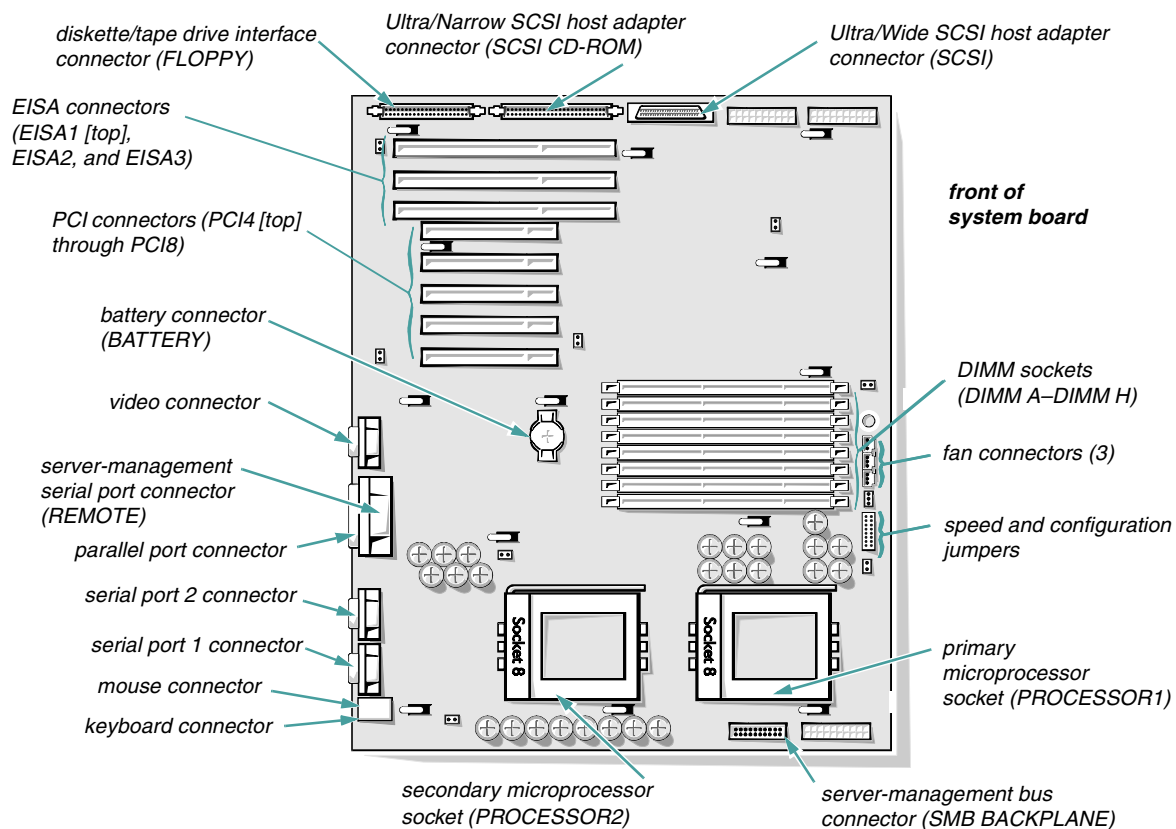
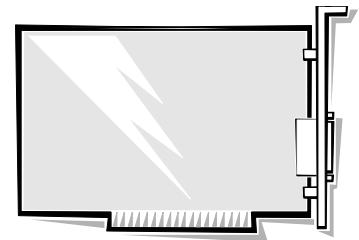


Figure 8-1. System Board Features

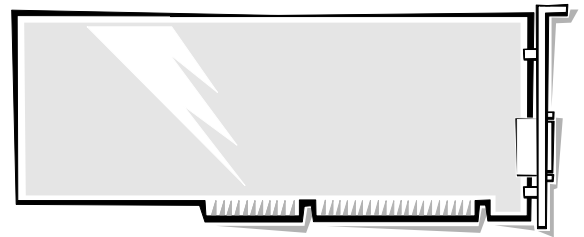
Expansion Cards

This computer can hold up to eight expansion cards, five of which can be 32-bit PCI cards. The system accommodates a mix of 32-bit EISA master or slave cards, 32-bit PCI cards, and 8- and 16-bit ISA cards. Figure 8-2 shows examples of the different types of expansion cards.

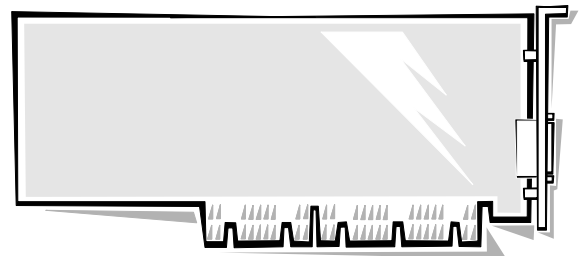
The system board contains a total of eight expansion-card connectors. An opening is available in the back panel of the computer for each expansion-card connector, thus providing eight usable expansion slots.



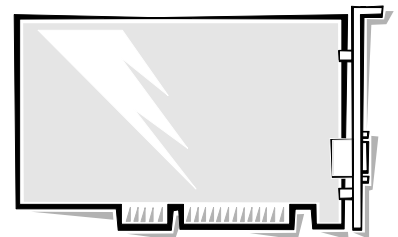
8-bit ISA expansion card



16-bit ISA expansion card



32-bit EISA expansion card



32-bit PCI expansion card

Figure 8-2. Expansion Cards

Connectors EISA1 through EISA3 support 32-bit EISA master or slave cards, and 8- and 16-bit ISA cards. Connectors PCI4 through PCI8 support 32-bit PCI cards. Video expansion cards should be installed in one of the three primary PCI slots (PCI6, PCI7, or PCI8).

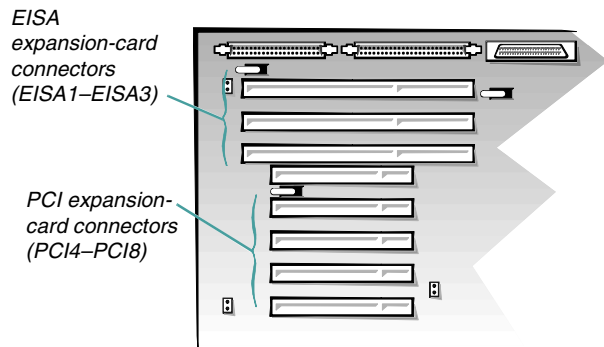


Figure 8-3. Expansion-Card Connectors on the System Board

Installing an Expansion Card

Follow this general installation procedure:

1. **If you are installing an ISA expansion card, start the EISA Configuration Utility, and add the new expansion card to the configuration information.**

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

*NOTES: If you are installing an EISA expansion card, you should normally run the EISA Configuration Utility **after** installing the expansion card.*

If you are installing a PCI expansion card, your system automatically performs any required PCI configuration tasks during the boot routine.

2. **Prepare the expansion card for installation, and remove the left computer cover.**

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing it for the system.

3. **Unscrew and remove the metal filler bracket that covers the card-slot opening for the expansion slot you intend to use.**
4. **If the expansion card is full-length, check that the locking cam on the corresponding locking card guide is in the raised or “unlocked” position. Insert the end of the expansion card in the card guide slot and lower the card into the chassis.**
5. **Insert the card-edge connector firmly into the expansion-card connector on the chassis.**
6. **When the card is firmly seated in the connector and the card-mounting bracket is flush with the brackets on either side of it, secure the bracket with the screw you removed in step 3.**

If the expansion card is full-length, close the locking cam on the card guide to secure the card.

7. **Connect any cables that should be attached to the card.**

See the documentation that came with the card for information about cable connections.

8. **Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.**

9. **Start the EISA Configuration Utility and add the new expansion card to the configuration.**

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

NOTE: If you installed a PCI expansion card, the system automatically performs any required PCI configuration tasks during the boot routine.

Removing an Expansion Card

Follow this general procedure to remove an expansion card:

1. **If you are relocating or removing an ISA expansion card permanently, start the EISA**

Configuration Utility and delete the expansion card from the configuration.

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

2. Remove the left computer cover.

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. If necessary, disconnect any cables connected to the card.

4. Unscrew the card-mounting bracket.

If the expansion card is full-length, release the locking cam on the card guide.

5. Grasp the card by its top corners, and ease it out of its connector.

6. If you are removing the card permanently, install a metal filler bracket over the empty card-slot opening.

NOTE: Installing a filler bracket over an empty expansion slot is necessary to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the computer and aid in proper cooling and air-flow inside the computer.

7. Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.

8. If you are relocating or removing an EISA expansion card, start the EISA Configuration Utility, and delete the expansion card from the configuration information.

See Chapter 5, “Using the EISA Configuration Utility,” in the system *User’s Guide* for instructions.

NOTE: If you removed a PCI expansion card, the system automatically performs any required re-configuration tasks during the boot routine.

Adding Memory

The eight dual in-line memory module (DIMM) sockets on the system board can accommodate 64 to 1024 megabytes (MB) of dynamic random-access memory (DRAM). The Dell PowerEdge 4100 systems use 72-bit, buffered, extended-data out (EDO) DIMMs in these 168-pin sockets. The DIMM sockets are located near the right edge of the system board (see Figure 8-1).

Memory Upgrade Kits

The system is upgradable to 1024 MB by installing combinations of 32- and 128-MB DIMMs. The DIMMs should be rated at 60 nanoseconds (ns) or faster. Table 8-1 shows several sample memory configurations. Memory upgrade kits can be purchased from Dell as needed.

DIMM Installation Guidelines

Starting with the socket farthest from the microprocessor sockets, the DIMM sockets are labeled “DIMM A” through “DIMM H” (see Figure 8-1).

When installing DIMMs, follow these guidelines:

- Install a DIMM in socket DIMM A before socket DIMM B, socket DIMM B before socket DIMM C, and so on.
- If you install different sizes of DIMMs, install them in order of descending capacity, beginning with socket DIMM A.
- DIMMs need not be installed in pairs.

Table 8-1 illustrates several sample memory configurations based on these guidelines.

Table 8-1. Sample DIMM Configurations

Total Desired Memory	DIMM Sockets							
	DIMM A	DIMM B	DIMM C	DIMM D	DIMM E	DIMM F	DIMM G	DIMM H
64 MB	32 MB	32 MB	None	None	None	None	None	None
128 MB	32 MB	32 MB	32 MB	32 MB	None	None	None	None
128 MB	128 MB	None	None	None	None	None	None	None
192 MB	128 MB	32 MB	32 MB	None	None	None	None	None
320 MB	128 MB	128 MB	32 MB	32 MB	None	None	None	None
512 MB	128 MB	128 MB	128 MB	128 MB				
1024 MB	128 MB	128 MB	128 MB	128 MB	128 MB	128 MB	128 MB	128 MB

Performing a Memory Upgrade

Use the following procedure to perform a memory upgrade to the system board:

1. Remove the left computer cover.

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

2. Locate the DIMM sockets in which you will install or replace DIMMs.

Figure 8-1 shows the location of the DIMM sockets on the system board.

3. Install or replace the DIMMs as necessary to reach the desired memory total.

Follow the instructions in “Installing DIMMs” or “Removing DIMMs” found later in this section, as appropriate.

4. Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.

After the system completes the power-on self-test (POST) routine, it runs a memory test that displays

the new memory total, which includes all newly installed memory.

NOTE: If the memory total is incorrect, turn off and disconnect the computer and peripherals from their power sources, remove the computer cover, and check all the installed DIMMs to make sure they are seated properly in their sockets. Then repeat step 4.

The system detects that the new memory does not match the system configuration information, which is stored in nonvolatile random-access memory (NVRAM). The monitor displays an error message to that effect, ending with the following words:

Press <F1> to continue; <F2> to enter System Setup.

5. Press <F2> to enter the System Setup program, and check the SYSTEM MEMORY category in the system data box on the System Setup screens.

The system should have already changed the value in the **SYSTEM MEMORY** category to reflect the newly installed memory. Verify the new total.

*NOTE: The value of **SYSTEM MEMORY** is given in kilobytes. To convert kilobytes to megabytes, divide the kilobyte total by 1024.*

If the total is incorrect, one or more of the DIMMs may not be installed properly. Repeat this procedure again, checking to make sure the DIMMs are firmly seated in their sockets.

6. **Enter the EISA Configuration Utility. Then save the configuration and exit the utility.**

Running the EISA Configuration Utility and saving the configuration is required for the system to recognize the newly installed DIMM(s). See Chapter 5, “Using the EISA Configuration Utility,” in the *User's Guide* for instructions on running the utility and saving the configuration.

7. **Run the RAM Test Group in the system diagnostics.**

See Chapter 5, “Running the System Diagnostics,” for information.

Installing DIMMs

Install DIMMs starting with socket DIMM A, located farthest from the microprocessor sockets, and working towards DIMM H. If a DIMM is already installed in the socket you need, you must remove it. Follow the instructions in the next subsection, “Removing DIMMs,” if appropriate.

To install a DIMM, follow these steps:

1. **Press the ejectors on the DIMM socket down and outward as shown in Figure 8-4 to allow the DIMM to be inserted in the socket.**
2. **Align the DIMM's edge connector with the slot in the center of the DIMM socket, and insert the DIMM in the socket.**

The card-edge connector on the DIMM is keyed using two notches so that the DIMM can be installed in the socket in only one way (see Figure 8-4).

3. **Press down on the two outer edges of the DIMM with your thumbs while pulling up on the ejectors with your index fingers to lock the DIMM into the socket.**

When the DIMM is properly seated in the socket, the ejectors on the DIMM socket should align with the ejectors on the other DIMM sockets.

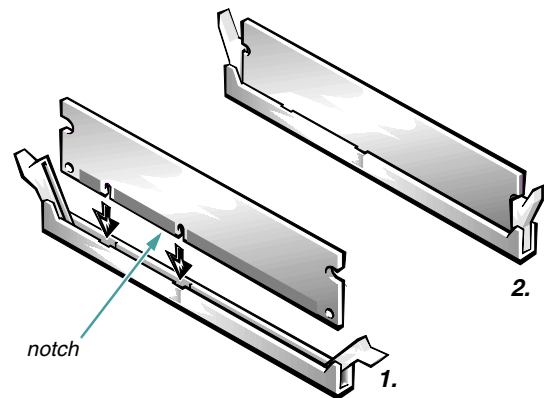


Figure 8-4. Installing a DIMM

4. **Continue with step 4 of “Performing a Memory Upgrade” found earlier in this section.**

Removing DIMMs

To remove a DIMM, press down and outward on the ejectors on each end of the socket until the DIMM pops out of the socket (see Figure 8-5).

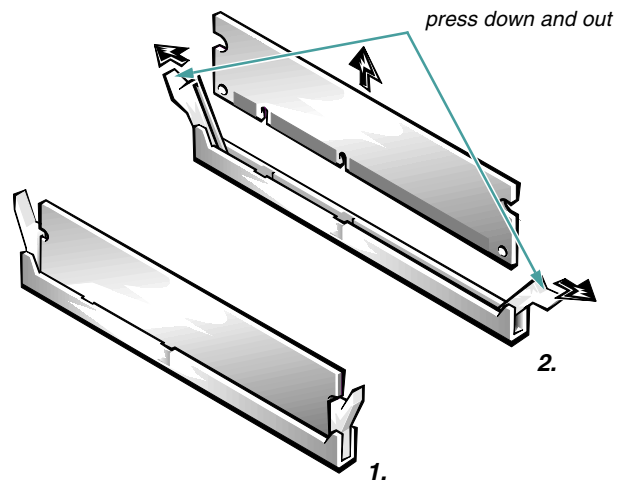


Figure 8-5. Removing a DIMM

Upgrading the Microprocessor or Installing a Secondary Microprocessor

In addition to the zero insertion force (ZIF) socket for the primary microprocessor on the system board, there is a second ZIF socket to accommodate a secondary microprocessor. The secondary microprocessor must have the same operating frequency as the primary microprocessor. For example, if the system has a 180 megahertz (MHz) Pentium Pro primary microprocessor, your secondary microprocessor must also be a 180-MHz Pentium Pro microprocessor.

NOTE: If you are upgrading a system by installing a secondary microprocessor, you must order a microprocessor upgrade kit from Dell. The upgrade kit from Dell contains the correct version of the microprocessor for use as a secondary microprocessor. Not all versions of the Pentium Pro microprocessor will work properly as a secondary microprocessor.

The following items are included in a microprocessor upgrade kit:

- The new microprocessor chip
- A new heat sink
- A new heat sink clip
- A new snap-in badge

Use the following procedure to remove the old microprocessor and install the upgrade or to add a second microprocessor.

1. Remove the left computer cover.

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

2. Remove the metal clip that secures the heat sink to the microprocessor socket.

CAUTION: Never remove the heat sink from a microprocessor unless you intend to remove the microprocessor. The heat sink is necessary to maintain proper thermal conditions.

WARNING: The microprocessor chip and heat sink can get extremely hot. Be sure the microprocessor has had sufficient time to cool before you touch it.

Press down on the folded part of the clip with a small screwdriver to release the clip (see Figure 8-6).

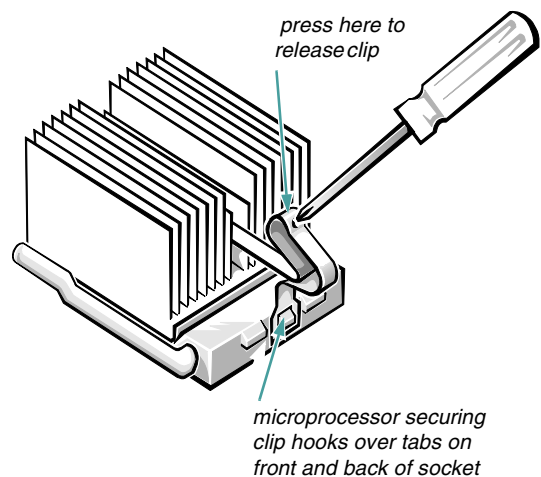


Figure 8-6. Microprocessor Securing Clip

3. Remove the heat sink.

The thermal interface pad is bonded to the heat sink and will remain attached to the old heat sink.

4. Remove the microprocessor chip from the socket.

CAUTION: Be careful not to bend any of the pins when removing the microprocessor chip from its socket. Bending the pins can permanently damage the microprocessor chip.

To remove the microprocessor chip, pull the socket release lever straight up until the chip is released (see Figure 8-7). Then lift the chip out of the socket. Leave the release lever up so that the socket is ready for the new microprocessor.

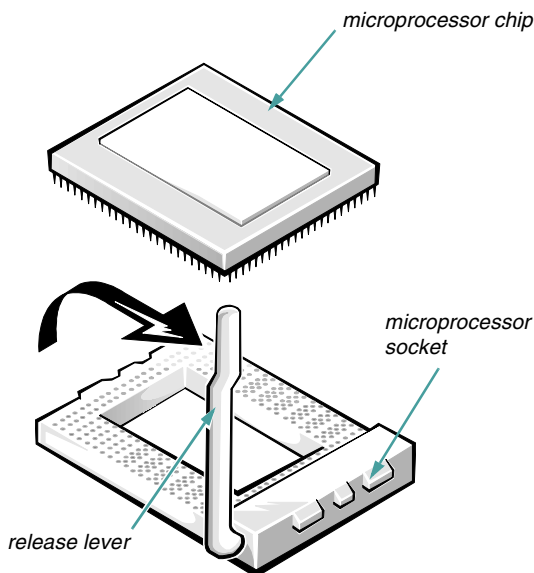


Figure 8-7. Removing the Microprocessor

5. Unpack the new microprocessor.

CAUTION: Be careful not to bend any of the pins when unpacking the microprocessor chip from its socket. Bending the pins can permanently damage the microprocessor chip.

If any of the pins on the microprocessor appear bent, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance from Dell.

6. Align the pin-1 corner of the microprocessor chip (see Figure 8-8) with the pin-1 corner of the microprocessor socket.

NOTE: Identifying the pin-1 corners is critical to positioning the chip correctly.

Identify the pin-1 corner of the microprocessor by turning the chip over and locating the tiny gold finger that extends from one corner of the large central

rectangular area. The gold finger points toward pin 1, which is also uniquely identified by a square pad.

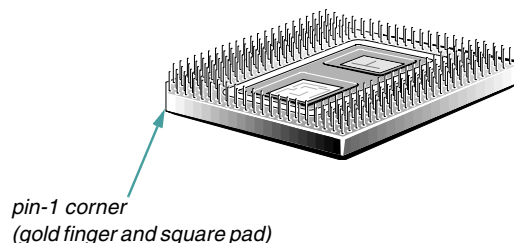


Figure 8-8. Pin-1 Identification

7. Install the microprocessor chip in the socket (see Figure 8-9).

CAUTION: Positioning the microprocessor incorrectly can permanently damage the chip and the computer when you turn on the system.

If the release lever on the microprocessor socket is not all the way up, move it to that position now.

With the pin-1 corners of the chip and socket aligned, set the chip lightly in the socket and make sure all pins are matched with the correct holes in the socket. Because the system uses a ZIF microprocessor socket, *there is no need to use force* (which could bend the pins if the chip is misaligned). When the chip is positioned correctly, it should drop down into the socket with minimal pressure.

CAUTION: When placing the microprocessor chip in the socket, be sure that all of the pins on the chip go into the corresponding holes of the socket. Be careful not to bend the pins.

When the chip is fully seated in the socket, rotate the socket release lever back down until it snaps into place, securing the chip.

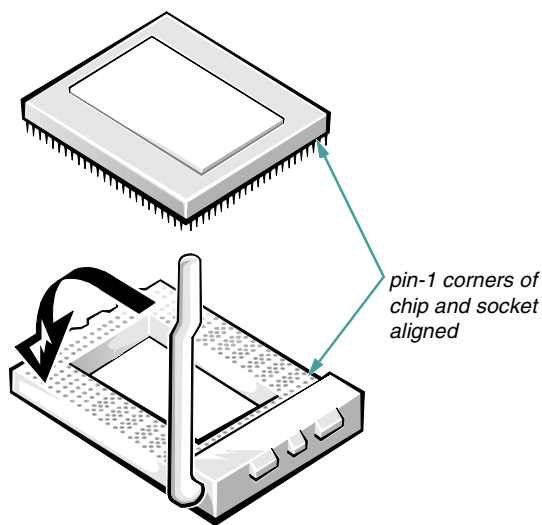


Figure 8-9. Installing the Microprocessor Chip

8. Place the new heat sink (with its bonded thermal interface pad) on top of the microprocessor chip (see Figure 8-10).

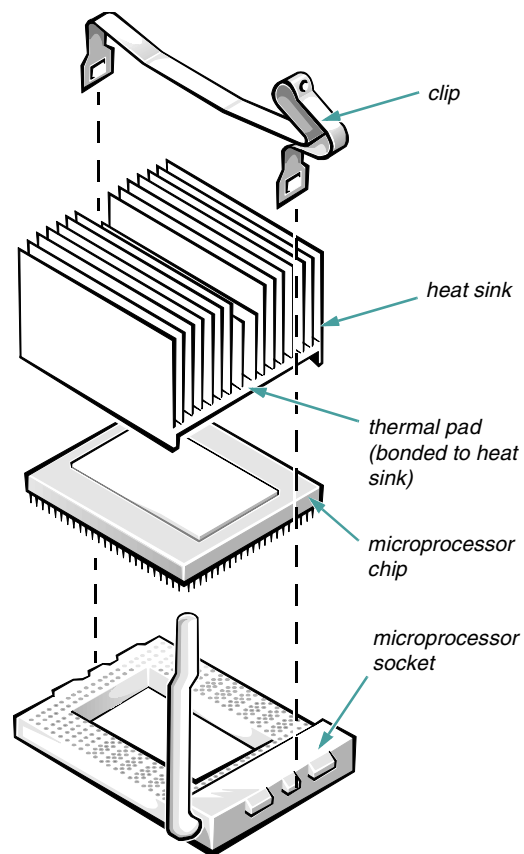


Figure 8-10. Installing the Heat Sink

9. Replace the microprocessor securing clip.

Orient the clip as shown in Figure 8-10, and hook the unfolded end of the clip over the tab on the edge of the socket facing the front of the computer. Then press down on the folded end of the clip to snap the clip over the tab on the back of the socket.

10. Change the microprocessor-speed jumper setting to correspond to the new microprocessor's operating frequency.

The microprocessor's speed jumper should be set for the installed microprocessor's rated internal speed. For example, for a 200-MHz Pentium Pro processor, a jumper plug should be installed on the jumper

labeled “200MHZ.” (See Appendix C, “Jumpers and Switches,” for more information on jumper locations.)

11. **Replace the left computer cover.**
12. **If you have upgraded the microprocessor to a faster one, remove the old badge from the front of the computer bezel and install the new badge:**
 - a. Remove the bezel according to the instructions in “Removing the Front Bezel” in Chapter 7.
 - b. The badge is secured to the front bezel with three metal tabs. Press on all three tabs at once to release the detent that holds the badge in place, and then push the tabs out of the front bezel. To install the new badge, insert the three metal tabs through the slots in the front bezel and press on the badge until the detents on the tabs lock into place.
 - c. Replace the front bezel.
13. **Reconnect your computer and peripherals to their power sources, and turn them on.**

As the system boots, it detects the presence of the new microprocessor and automatically changes the system configuration information in the System Setup program.
14. **Press <F2> to enter the System Setup program, and check that the PROCESSOR 1 and PROCESSOR 2 categories match the new system configuration.**

See Chapter 4, “Using the System Setup Program,” in the system *User’s Guide* for instructions.
15. **Run the system diagnostics to verify that the new microprocessor is operating correctly.**

See Chapter 5, “Running the System Diagnostics,” for information.

Replacing the Battery

The system battery maintains system configuration, date, and time information in a special section of memory when the system is turned off.

The operating life of the battery ranges from two to five years, depending on how the system is used (for example, if the system is on most of the time, the battery gets little use and thus lasts longer). The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

Time-of-day not set – please run SETUP program

Strike the F1 key to continue, F2 to run the setup utility

or

Invalid configuration information – please run SETUP program

Strike the F1 key to continue, F2 to run the setup utility

To determine if the battery needs replacing, reenter the time and date through the System Setup program. Turn off the system for a few hours, and then turn it on again. Enter the System Setup program. If the date and time are not correct in the System Setup program, replace the battery.

NOTES: Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time kept in the System Setup program, the problem may be caused by software rather than by a defective battery.

If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is not caused by a defective battery.

The system can be operated without a battery; however, the system configuration information maintained by the battery in NVRAM is erased each time the computer is turned off. Therefore, the system configuration information must be reentered and the options reset *each time the system boots* until the battery is replaced.

The battery is a 3.0-volt (V), coin-cell CR2450-type battery. To remove the battery, follow these steps:

1. **If possible, enter the System Setup program and make a printed copy of the system setup screens.**

See Chapter 4, “Using the System Setup Program,” in the system *User’s Guide* for instructions.

2. Remove the left computer cover.

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. Remove the battery.

Pry the battery out of its socket with your fingers or a blunt, nonconductive object, such as a plastic screwdriver.

4. Install the new battery with the “+” side facing up (see Figure 8-11).

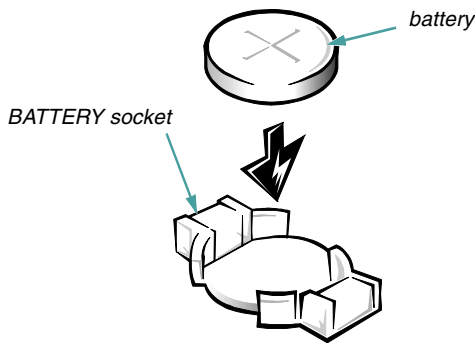


Figure 8-11. Battery Removal

5. Replace the left computer cover, reconnect the computer and peripherals to their power sources, and turn them on.

6. Enter the System Setup program to confirm that the battery is operating properly.

Enter the correct time and date through the System Setup program's **TIME** and **DATE** categories. Also reenter any system configuration information that is no longer displayed on the system setup screens, and then exit the System Setup program.

7. Turn the computer and peripherals off, and leave them off for at least an hour.

8. After an hour, turn on the system and enter the System Setup program. If the time and date are still incorrect, see Chapter 11, “Getting Help,” for instructions on obtaining technical assistance.

Chapter 9

Installing Drives in the External Bays

The external drive bays at the front of the Dell PowerEdge 4100 system hold up to four user-accessible, half-height 5.25- or 3.5-inch devices, typically diskette, tape, CD-ROM, or digital audio tape (DAT) drives. A 3.5-inch diskette drive and small computer system interface (SCSI) CD-ROM drive are standard in the first and second drive bays. The diskette drive is controlled by the system board's built-in diskette drive controller, whereas

the CD-ROM drive is connected to the system board's built-in Ultra/Narrow SCSI controller. Two additional drives of your choice can be installed in the lower two external drive bays. See Figure 9-1 for a general view of the various drives, control cables, and power cables in the external drive bays.

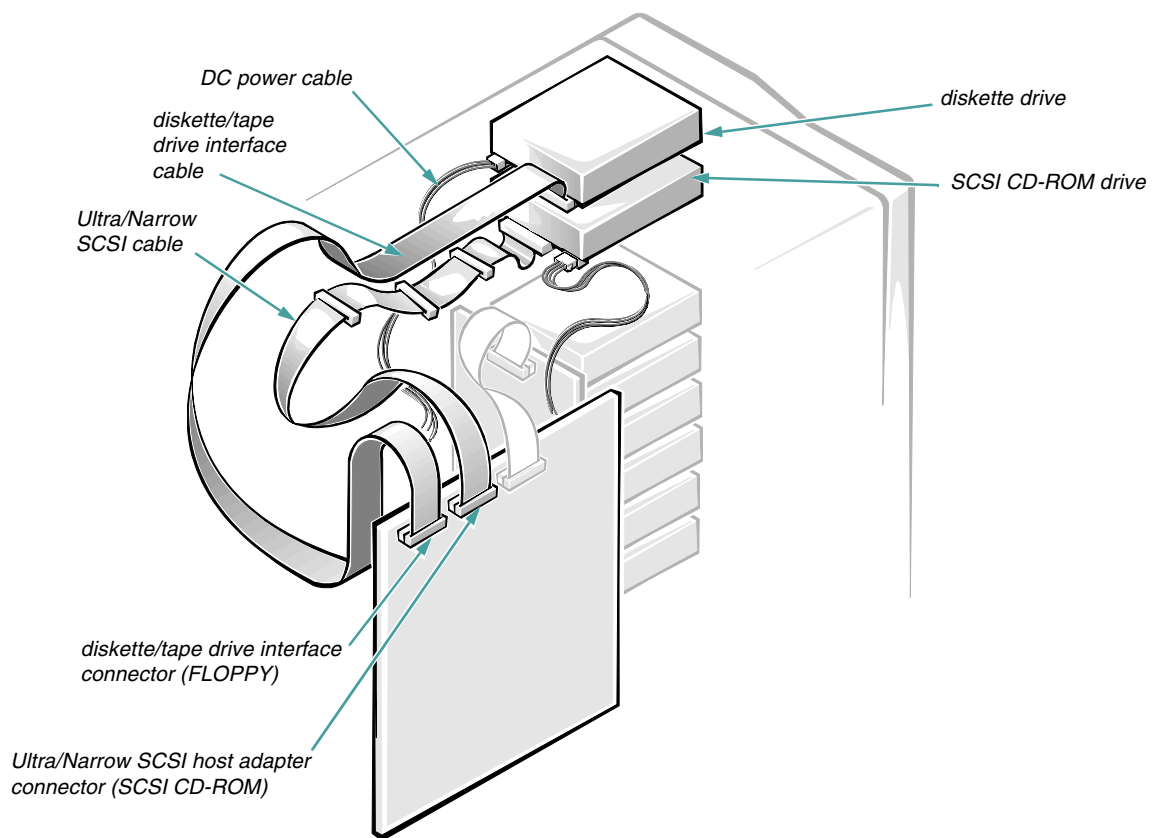


Figure 9-1. External Drive Bay Hardware

Before You Begin

This chapter describes how to install the following options:

- Drives that use the computer's built-in diskette drive controller.
- Tape drives that use a controller card

NOTE: If you are installing a SCSI hard-disk drive, see Chapter 10, "Installing Drives in the Internal Bays."

In order to remove or install drives in the external bays, you must remove the computer covers and front bezel according to the instructions in "Removing the Computer Covers" and "Removing the Front Bezel" in Chapter 7.

To protect the inside of the computer from foreign particles, a plastic front-panel insert covers each empty external drive bay. Before you install a drive in an empty bay, you must first remove the front-panel insert.

Whenever you remove a drive, be sure to replace the front-panel insert over the empty bay.

Removing and Replacing Front-Panel Inserts

To remove the front-panel insert for a drive bay you intend to use, first remove the front bezel as instructed in "Removing the Front Bezel" in Chapter 7. Then, facing the inside of the front bezel, press against the center of the insert with your thumbs until the insert bows sufficiently to loosen the tabs on the sides of the insert (see Figure 9-2). Pull the insert out of the bezel.

To replace a front-panel insert, position the insert over the bay opening from the inside of the front bezel and carefully press the insert into place. A tab on each side of the insert snaps into a corresponding latch on the inside of the front bezel.

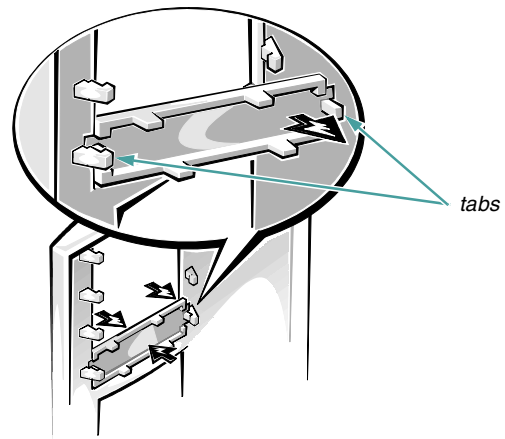


Figure 9-2. Removing a Front-Panel Insert

Connecting the Drive

This section describes the power input connectors and interface connectors on the backs of most drives.

Figure 9-3 shows the 4-pin power input connector, where you connect a direct current (DC) power cable from the system power supply or optional power-supply paralleling board.

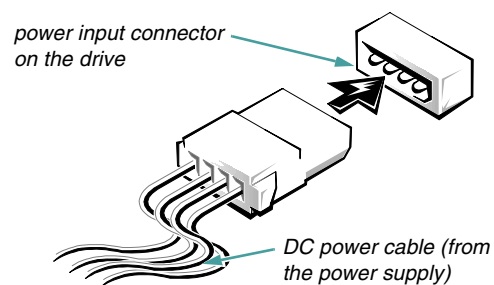


Figure 9-3. Power Connectors

The power connectors are *keyed* to avoid incorrect insertion; do not force two connectors together if they do not fit properly.

A ribbon cable (see Figure 9-4) functions as the interface cable for most types of drives.

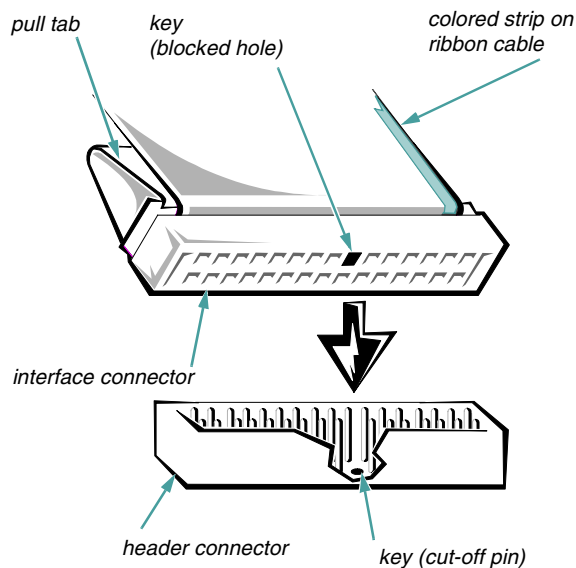


Figure 9-4. Header Connector

Most interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector. Keying ensures that the pin-1 wire in the cable (indicated by the colored strip along one edge of the cable) goes to the pin-1 ends of the connectors on both ends. A *header connector* is usually keyed by the omission of one of its pins with the corresponding hole filled in on the connector on the cable (see Figure 9-4).

CAUTION: When connecting an interface cable, do not reverse the interface cable (do not place the colored strip away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

DC Power Cables

Each drive in the external drive bays must connect to a 4-wire DC power cable from the system power supply or optional power-supply paralleling board. The connectors on this cable are labeled “FD1,” “FD2,” “FD3,” “FD4,” and “FD5.” Connectors FD1 through FD4 are used for 5.25-inch devices, whereas connector FD5 is used for the standard 3.5-inch diskette drive. Before connecting a drive to a power cable, refer to Figure 9-5 to identify the correct cable connector to use for the drive.

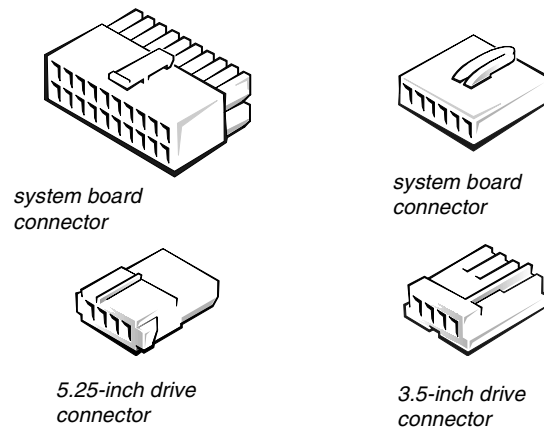


Figure 9-5. DC Power Cable Connectors

Installing SCSI Devices in the External Bays

SCSI devices in the external drive bay (such as CD-ROM drives and tape drives) are controlled by the Ultra/Narrow SCSI controller on the system board.

SCSI Configuration Information

Although SCSI devices are installed essentially the same way as other devices, their configuration requirements are different. To configure SCSI devices installed in the external bays, follow the guidelines in the following subsections.

SCSI ID Numbers

Each device attached to the Ultra/Narrow SCSI host adapter must have a unique SCSI identification (ID) number from 0 to 7.

When SCSI devices are shipped from Dell, the default SCSI ID numbers are assigned as follows:

- The computer's built-in Ultra/Narrow SCSI host adapter is configured through the basic input/output system (BIOS) as SCSI ID 7.
- A SCSI tape drive is configured as SCSI ID 6 (the default ID number for a tape drive).
- A SCSI CD-ROM drive is usually configured as SCSI ID 5.

*NOTE: There is **no** requirement that SCSI ID numbers be assigned sequentially or that devices be attached to the cable in order by ID number.*

Device Termination

SCSI logic requires that the two devices at opposite ends of the SCSI chain be terminated and that all devices in between be unterminated.

Before installing SCSI devices in the computer, you must configure the terminators on the SCSI device(s) to conform to the following guidelines:

- A single SCSI device (such as the standard CD-ROM drive) is terminated.
- If two or more SCSI devices are installed, connect the devices as follows:
 - Attach one of the devices to the end connector on the SCSI cable, and leave the terminator enabled on that device.
 - The other end of the SCSI cable connects to the computer's built-in Ultra/Narrow SCSI host adapter or to an optional SCSI host adapter card.
 - Disable the terminators on all other devices you attach to the cable.

The standard SCSI CD-ROM drive is configured as the last device on the SCSI cable. Therefore, any additional devices attached to the cable should have their terminators disabled.

See the documentation provided with the SCSI device for information on disabling the device's terminator.

SCSI Cable

CAUTION: Dell recommends that you use only SCSI cables purchased from Dell. SCSI cables purchased elsewhere are not guaranteed to work reliably with the Dell PowerEdge 4100 systems.

The 50-pin Ultra/Narrow SCSI cable has five connectors:

- The connector at the end of the cable farthest away from the other four connectors attaches to the SCSI host adapter connector labeled "SCSI CD-ROM" on the system board.
- The four connectors on the cable attach to devices in the external drive bays.

Installing a SCSI Device

To install an external SCSI device that uses the built-in Ultra/Narrow SCSI controller, follow these steps:

1. Prepare the drive for installation.

Ground yourself by touching an unpainted metal surface on the back of the computer, unpack the drive, and compare the jumper and switch settings with those in the drive documentation. (See "SCSI Configuration Information" found earlier in this chapter for information on setting the drive's SCSI ID number and enabling termination [if required].) Change any settings necessary for this system's configuration.

If the drive does not already have drive rails attached, attach a drive rail to each side of the drive. Orient the drive rails as shown in Figure 9-6. Secure each drive rail to the drive with a screw in each of the *lower* slotted screw holes on the drive rail.

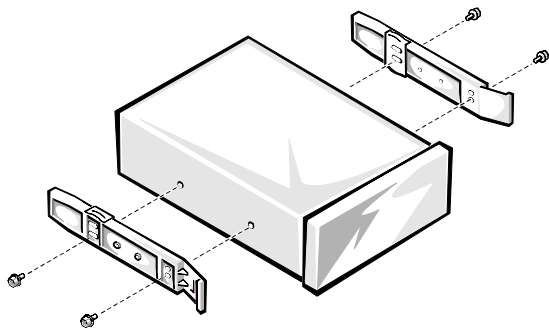


Figure 9-6. Attaching Drive Rails

2. Remove the computer covers and front bezel.

See “Removing the Computer Covers” and “Removing the Front Bezel” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. Slide the new drive into its bay until it snaps securely into place.

If necessary, you can adjust drive alignment by repositioning one or both rails.

4. Connect a DC power cable and one of the connectors on the Ultra/Narrow SCSI cable to the back of the drive (see Figure 9-7).

If other installed drives are in the way, temporarily move them out of the way. Press in on the plastic drive rails at the front of the bay to disengage a drive, and then slide the drive slightly toward the front of the chassis.

Refer to “DC Power Cables” (found earlier in this chapter) to determine the correct DC power cable connector to use for the drive. Plug the DC power cable connector into the 4-pin power input connector on the back of the drive.

Select the connector on the Ultra/Narrow SCSI cable that most easily reaches the new SCSI device, and press the interface cable connector firmly into the drive’s interface connector.

If you moved other drives at the beginning of this step, snap them back into place.

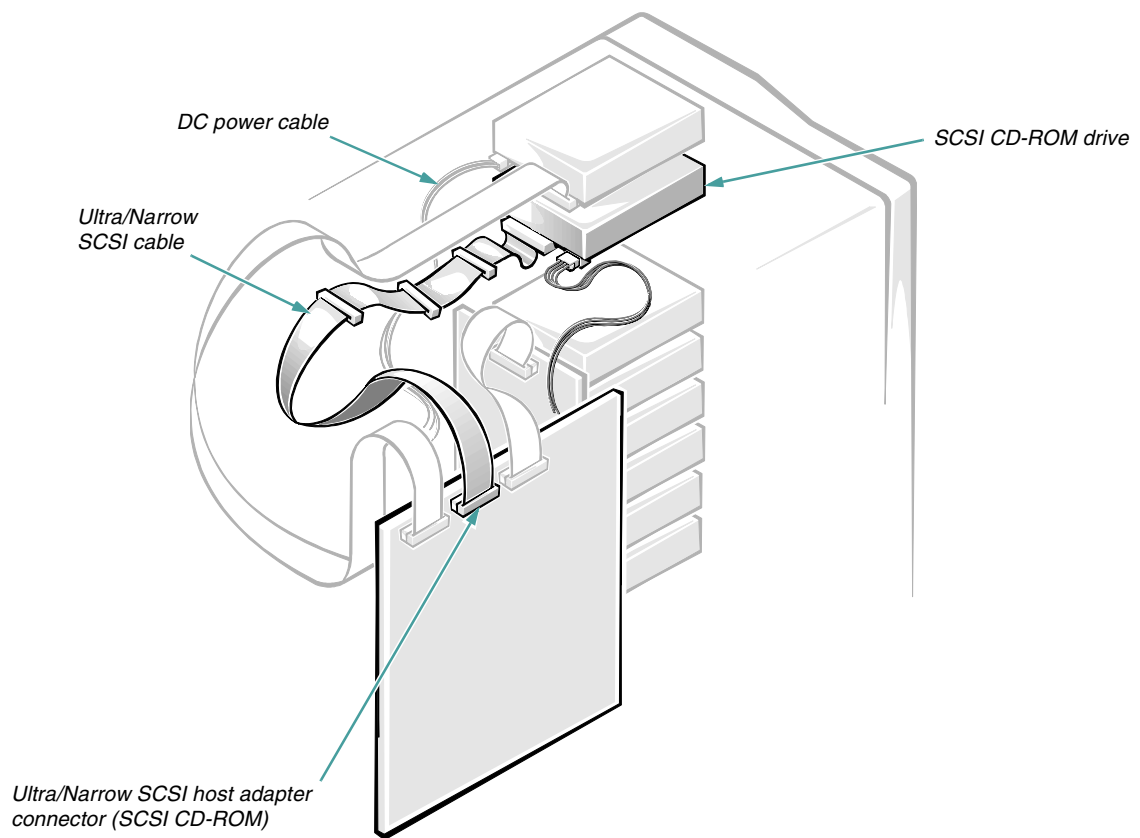


Figure 9-7. Cable Connections for a SCSI Device in the External Drive Bays

5. Check all cable connections that may have been loosened during this procedure. Arrange cables so they will not catch on the computer cover or block the airflow of the fans or cooling vents.
6. If a front-panel insert on the computer cover blocks the bay in which you installed the drive, remove the insert.
See “Removing and Replacing Front-Panel Inserts” found earlier in this chapter.
7. Replace the front bezel and computer covers.
8. Reconnect the computer and peripherals to their power sources, and turn them on.

9. Test the SCSI devices.

To test a SCSI tape drive, refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Installing an Internal Tape Drive That Uses a Controller Card

Tape drives that require their own separate controller cards are shipped with the controller card and an interface cable. Install the drive in the third or bottom bay of the upper drive cage by performing the following steps:

1. Configure the controller card if necessary.

Refer to the documentation accompanying the tape drive and the card. If the card incorporates jumpers

or switches that must be set to work with the system, verify or change the settings as necessary.

2. Remove the computer covers and front bezel.

See “Removing the Computer Covers” and “Removing the Front Bezel” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. Slide the new drive into its bay until it snaps securely into place.

If necessary, you can adjust drive alignment by repositioning one or both rails.

4. Install the controller card in an expansion slot.

See “Installing an Expansion Card” in Chapter 8.

5. Connect a DC power cable to the tape drive.

If other installed drives are in the way, disengage them by pressing in on the plastic drive rails at the front of the bay, and slide them slightly toward the front of the chassis.

Refer to “DC Power Cables” found earlier in this chapter to determine which DC power cable connector to use. Plug the DC power cable connector into the 4-pin power input connector on the back of the drive.

6. Attach the interface cable that came with the drive kit to the card-edge connector on the back of the drive.

7. Route the other end of the interface cable through a cutout in the center wall of the chassis to the controller card, and connect the interface cable to the controller connector on the card.

Refer to the controller card’s documentation to identify the controller connector on the card.

8. If you moved other drives in step 5, snap them back into place.

9. Check all cable connections that may have been loosened during this procedure. Arrange cables so they will not catch on the computer cover or block the airflow of the fans or cooling vents.

10. If a front-panel insert on the computer cover blocks the bay in which you installed the drive, remove the insert.

See “Removing and Replacing Front-Panel Inserts” found earlier in this chapter.

11. Replace the computer bezel and covers.

12. Reconnect the computer and peripherals to their power sources, and turn them on.

13. Perform a tape backup and verification test with the drive as instructed in the tape-drive software documentation that came with the drive.

If the controller card is an ISA or EISA expansion card, run the EISA Configuration Utility and update the system configuration. See Chapter 5, “Using the EISA Configuration Utility,” in the *User’s Guide* for instructions on running the utility and saving the configuration information.

NOTE: You do not need to update the system configuration information for a tape drive attached to its own controller card.

Installing an External Tape Drive That Uses a Controller Card

Complete the following procedure to install an external tape drive that uses a controller card and shielded interface/DC power cable:

1. Prepare the tape drive and controller card for installation.

Ground yourself by touching an unpainted metal surface on the back of the computer. Unpack the tape drive and controller card, and configure them for the system according to the instructions in the documentation that came with the tape drive.

2. Remove the left computer cover.

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

- 3. Install the controller card in an expansion slot.**
See “Installing an Expansion Card” in Chapter 8.
- 4. Replace the left computer cover.**
- 5. Connect the tape drive’s interface/DC power cable to the external connector on the controller card; secure the connection by tightening the screws on the connector.**
- 6. Reconnect the computer and peripherals to their power sources, and turn them on.**
- 7. Perform a tape backup and verification test with the drive as instructed in the tape-drive software documentation that came with the drive.**

Chapter 10

Installing Drives in the Internal Bays

This chapter describes how to install and configure small computer system interface (SCSI) hard-disk drives in the computer's six internal drive bays. (See Chapter 9, "Installing Drives in the External Bays," for information on installing SCSI CD-ROM drives and tape drives in the external drive bays.)

Dell PowerEdge 4100 systems include a SCSI backplane board, which greatly simplifies cabling and configuration for SCSI hard-disk drives. All SCSI identification (ID) and termination for SCSI hard-disk drives are configured by the SCSI backplane board, rather than on individual drives.

In the standard Dell PowerEdge 4100 system configuration, the Ultra/Wide SCSI host adapter on the system board controls the SCSI backplane board. When used in combination with an optional PowerEdge Expandable RAID Controller host adapter card, the SCSI backplane board allows you to remove and insert hard-disk drives without shutting down the system—an invaluable feature for servers that contain important data and programs for an entire network of users. You can replace a failed drive without forcing all users on the network to log off and lose valuable time and possibly data. See "Removing and

Inserting a SCSI Hard-Disk Drive With the System Running" found later in this chapter for details.

CAUTION: Removing and installing hard-disk drives with the system running is *not* supported for systems *without* a PowerEdge Expandable RAID Controller host adapter card. Removing a drive will result in a loss of data.

Figure 10-1 illustrates the internal drive bays, SCSI backplane board, and the Ultra/Wide SCSI cable. The Ultra/Wide SCSI cable has two connectors:

- The connector at one end attaches to the SCSI host adapter connector labeled "SCSI BACKPLANE" on the system board or to an optional SCSI host adapter card such as the PowerEdge Expandable RAID Controller host adapter card.
- The connector at the other end of the cable attaches to the connector labeled "SCSI" on the SCSI backplane board.

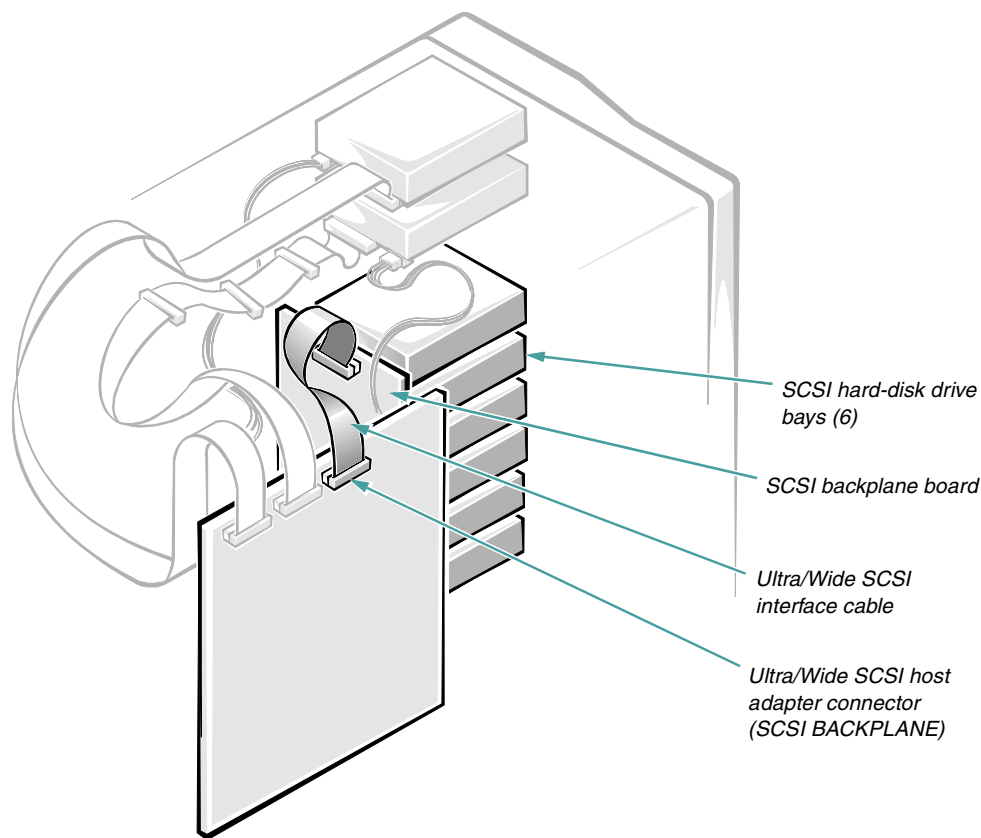


Figure 10-1. Internal Drive Hardware

Installing SCSI Hard-Disk Drives in the Internal Drive Bays

SCSI hard-disk drives are supplied by Dell in special drive carriers that fit in the internal drive bays (see Figure 10-2). The printed circuit board at the back of the drive carrier acts as an interface between the SCSI hard-disk drive and the SCSI backplane board.

NOTE: Dell recommends that you use only drives that Dell has tested and approved for use with the SCSI backplane board.

SCSI Hard-Disk Drive Configuration

The SCSI backplane board provides termination for the SCSI bus. None of the drives connected to the SCSI backplane board should have their termination enabled. All SCSI ID numbers for the drives are set by the SCSI backplane board.

Removing and Installing a SCSI Hard-Disk Drive

The following subsections describe how to remove or install SCSI hard-disk drive carriers in the computer's internal drive bays.

Removing a SCSI Hard-Disk Drive

Remove a SCSI hard-disk drive from an internal drive bay as follows:

1. **If a PowerEdge Expandable RAID Controller host adapter card is not installed in the computer, turn off the system.**
2. **Release the carrier by pulling down the plastic drive handle. Slide the carrier toward you until it is free of the drive bay.**

Installing a SCSI Hard-Disk Drive

Install a SCSI hard-disk drive in an internal drive bay as follows:

1. **If a PowerEdge Expandable RAID Controller host adapter card is not installed in the computer, turn off the system.**
2. **Position the drive with its carrier side down and insert it, connector end first, into the bay (see Figure 10-2).**
3. **Holding the drive carrier by its sides, slide the drive into the bay.**
4. **When the pins on the drive carrier handle contact the drive bay, lift the handle to draw the drive carrier into the bay and lock the drive in place.**

5. **Install any required SCSI device drivers.**

See Chapter 3, “Installing and Configuring SCSI Drivers,” in the *User’s Guide* for information.

6. **Test the SCSI devices.**

Run the SCSI Devices Test Group in the system diagnostics. See Chapter 5, “Running the System Diagnostics.”

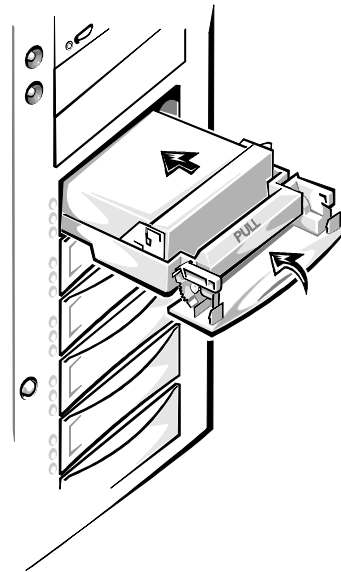


Figure 10-2. Installing a SCSI Hard-Disk Drive Carrier

Removing and Inserting a SCSI Hard-Disk Drive With the System Running

If the Dell PowerEdge 4100 system has a PowerEdge Expandable RAID Controller host adapter card installed and connected to the SCSI backplane board, you can remove and insert SCSI hard-disk drives while the system is running.

Before attempting to remove or insert a drive while the system is running, see the documentation for the PowerEdge Expandable RAID Controller host adapter card to ensure that the SCSI host adapter is configured correctly to support drive removal and insertion.

CAUTION: Removing and installing SCSI hard-disk drives with the system running is *not* supported for systems *without* a PowerEdge Expandable RAID Controller host adapter. Removing a drive in this situation will result in a loss of data.

SCSI Hard-Disk Drive Indicator Patterns

The three light-emitting diode (LED) indicators adjacent to each of the six SCSI hard-disk drive bays provide information on the status of the SCSI hard-disk drives. The SCSI backplane firmware controls the drive online and drive fault indicators, whereas the drive access indicator is usually controlled by the drive itself.

Table 10-1 lists the various drive indicator patterns. Different patterns are displayed as drive events occur. For example, in the event of a hard-disk drive failure, the “drive failed” pattern appears. After the drive is selected for removal, the “drive being prepared for removal” pattern appears, followed by the “drive ready for removal” pattern. After the replacement drive is installed, the “drive being prepared for operation” pattern appears, then the “drive online” pattern.

Table 10-1. SCSI Hard-Disk Drive Indicator Patterns

Condition	Indicator Pattern
Identify drive	All three drive status indicators flash simultaneously.
Drive being prepared for removal	The three drive status indicators flash sequentially.
Drive ready for insertion or removal	All three indicators are off.
Drive being prepared for operation	The drive online indicator is on. The drive activity indicator may flash briefly.
Drive bay empty	All three indicators are off.
Drive predicted failure	The drive online indicator turns off. The drive fault indicator blinks on briefly each second.
Drive failed	The drive online indicator turns off. The drive fault indicator blinks off briefly each second.
Drive rebuilding	The drive online indicator blinks rapidly.
Drive online	The online indicator is on.

Removing a SCSI Hard-Disk Drive With the System Running

Remove a SCSI hard-disk drive as follows:

1. **Wait until the drive status indicators adjacent to the drive bay signal that the drive may be removed safely.**

If the drive has been online, the three drive indicators will flash sequentially as the drive is powered down. When all three indicators are turned off, the drive is ready for removal.

2. **Remove the hard-disk drive.**

Follow the instructions in “Removing a SCSI Hard-Disk Drive,” found earlier in this chapter.

Inserting a SCSI Hard-Disk Drive With the System Running

Insert a SCSI hard-disk drive as follows:

1. **Remove the drive or empty carrier from the drive bay as described in the previous subsection.**
2. **Insert the “new” drive carrier into the bay.**

Follow the instructions in “Installing a SCSI Hard-Disk Drive” found earlier in this chapter.

The drive online indicator turns on.

Installing a PowerEdge Expandable RAID Controller Host Adapter Card

Use the following procedure to install the PowerEdge Expandable RAID Controller host adapter card:

1. **Unpack the PowerEdge Expandable RAID Controller host adapter card, and prepare it for installation.**

Refer to the documentation accompanying the host adapter card.

2. Remove the computer cover.

See “Removing the Computer Covers” in Chapter 7.

CAUTION: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

3. Remove the Ultra/Wide SCSI cable from the computer.

- One end of the cable attaches to the SCSI host adapter connector labeled “SCSI BACK-PLANE” on the system board.
- The cable’s other end attaches to the connector labeled “SCSI” on the SCSI backplane board.

4. Install the PowerEdge Expandable RAID Controller host adapter card in one of the peripheral component interconnect (PCI) expansion slots.

See “Installing an Expansion Card” in Chapter 8.

5. Connect the new Ultra/Wide SCSI cable provided in the PowerEdge Expandable RAID Controller kit to the connector labeled “SCSI” on the SCSI backplane board (see Figure 10-3).

6. Connect the other end of the SCSI cable to the PowerEdge Expandable RAID Controller host adapter card.

To identify the correct connector, refer to documentation for the PowerEdge Expandable RAID Controller host adapter card.

NOTES: If you will be attaching external SCSI devices using the external SCSI connection slots on the computer’s back panel, follow steps 7 through 10.

If SCSI devices are connected using the external SCSI connection slots, Ultra SCSI mode is not supported.

7. Connect the SCSI external access cable from the host adapter kit to the Ultra/Wide SCSI host adapter connector (labeled “SCSI BACK-PLANE”) on the system board.

See the documentation that came with each device for information on cabling that device as part of a daisy chain.

8. Attach the other end of the SCSI external access cable to the computer’s back panel. If you are attaching multiple external SCSI devices, daisy-chain the devices to each other using the cables shipped with each device (see Figure 10-4).

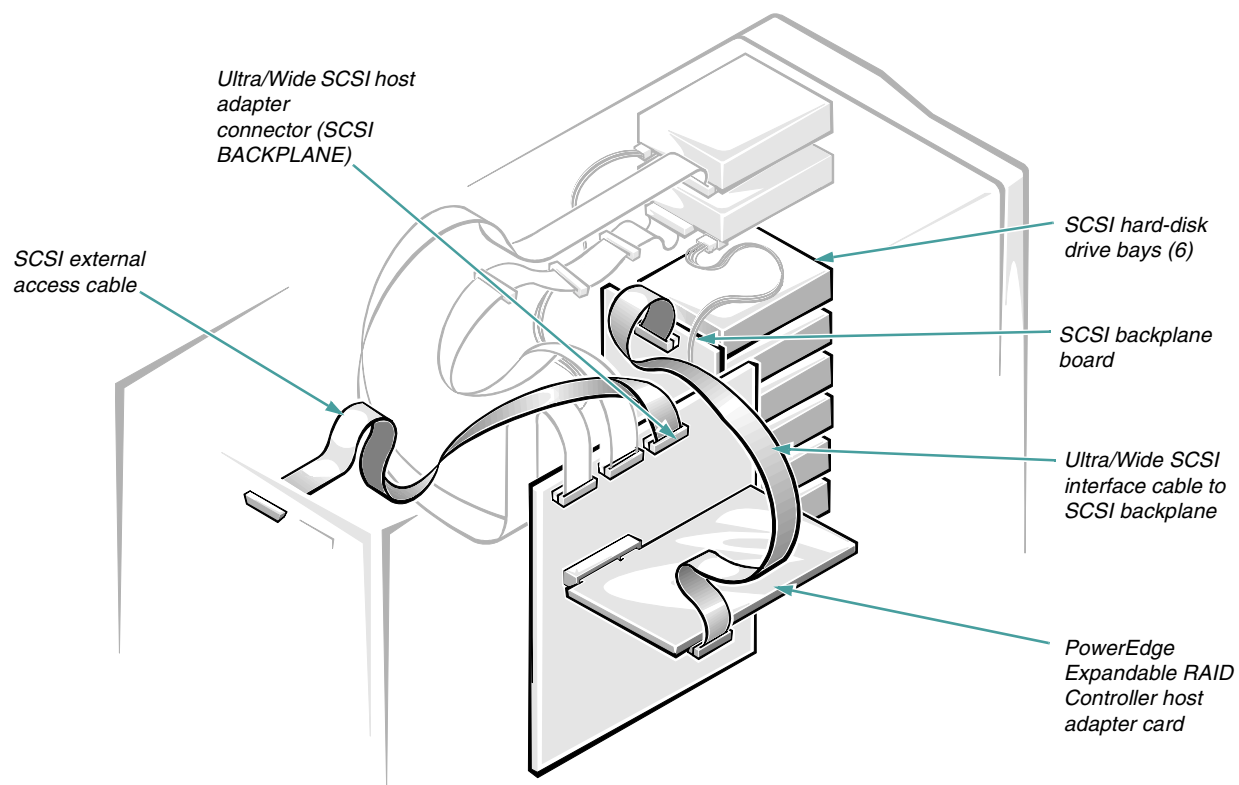


Figure 10-3. Cable Configuration for a PowerEdge Expandable RAID Controller Host Adapter Card

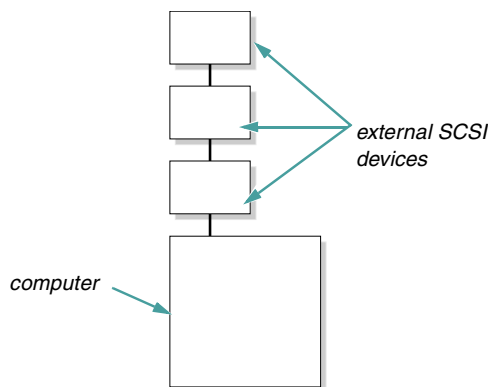


Figure 10-4. Daisy-Chaining External SCSI Devices

9. **Replace the computer cover, and reconnect the computer and peripherals to their power sources.**

10. **Connect the external device(s) to power.**

For each external device, plug the socket end of the power cable into the alternating current (AC) power receptacle on the back of the device. Plug the other end of the power cable into an AC power source.

11. **Install any required SCSI device drivers.**

See Chapter 3, “Installing and Configuring SCSI Drivers,” in the system *User’s Guide* for information and instructions.

12. **Test the SCSI devices.**

Test a SCSI hard-disk drive by running the SCSI Devices Test Group in the system diagnostics. See Chapter 5, “Running the System Diagnostics,” for information.

To test a SCSI tape drive, also refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Configuring the Boot Device

If the user plans to boot the system from a hard-disk drive, the drive must be attached to the primary (or boot) controller or SCSI host adapter card. The primary controller is automatically determined by the specific system configuration according to the following general guidelines:

- If the **PCI SCAN SEQUENCE** category in the System Setup program is set to **EMBEDDED FIRST**, the built-in Ultra/Wide host adapter is the primary controller.
- If the **PCI SCAN SEQUENCE** category in the System Setup program is set to **SLOT DEVICES FIRST**, the system boots from a SCSI host adapter card in an expansion slot. If more than one SCSI host adapter card is installed, the boot order is determined by the particular expansion slot the card is installed in. In *descending* order of precedence, the boot order for the Dell PowerEdge 4100 system is PC15, PC14, PC18, PC17, and PC16.

Partitioning and Formatting SCSI Hard-Disk Drives

You may need to use different programs than those provided with the operating system to partition and format SCSI hard-disk drives. See Chapter 3, “Installing and Configuring SCSI Drivers,” in the system *User’s Guide* for information and instructions.

Chapter 11

Getting Help

This chapter describes the tools Dell provides to help you when you have a problem with a computer system. It also tells you when and how to call Dell Computer Corporation for technical or customer assistance in the following situations:

- *If you have a technical problem*, read the next section, “Technical Assistance.”
- *If you are looking for information about a specific subject or about Dell’s services*, read “Help Tools” found later in this chapter.
- *If you have a problem with an order*, read “Problems With an Order” found later in this chapter.
- *If you need to return an item for warranty repair or credit*, read “Returning Items for Warranty Repair or Credit” found later in this chapter.
- *If you would like to place an order or need information about additional products available from Dell*, call Dell at the appropriate telephone number listed in “Dell Contact Numbers” found later in this chapter.

Technical Assistance

If you need assistance with a technical problem, perform the following steps:

- 1. Review the documentation that accompanied the Dell system.**

To decide which document has the answers you need, consult the Preface of the system documentation.

- 2. Run the diagnostics for the Dell system.**

See Chapter 5, “Running the System Diagnostics,” for instructions on using the system diagnostics.

- 3. Make a copy of the Diagnostics Checklist (found in Appendix A), and fill it out.**

NOTE: Save the Diagnostics Checklist in Appendix A as a master so you can use it to make copies as needed.

On the Diagnostics Checklist, document any error messages or beep codes as they occur so you can inform the Dell technician of them. Describe what you were doing when the error occurred. Note the steps you have taken to solve the problem.

- 4. Use the AutoTech service for help with installation and troubleshooting procedures.**

For instructions on using the AutoTech service, see “AutoTech Service” found later in this chapter.

- 5. If the preceding steps have not resolved the problem and you need to talk to a Dell technician, you can call Dell’s customer technical support service.**

For instructions on using the technical support service, see “Technical Support Service” found later in this chapter.

Help Tools

Dell provides a number of tools to assist you. Table 11-1 lists subjects you may want information about, tasks you

may want to perform, and the tool(s) you can use for help. Each tool is described later in this section.

Table 11-1. Help Tools

Subject or Task	Tool
BIOS revisions	TechConnect BBS
Frequently asked questions	AutoTech service
Information about Dell, its products, and its services	TechFax service, World Wide Web on the Internet
Installation instructions	<i>Installation and Troubleshooting Guide</i> , technical support service, AutoTech service
Interrupt maps	TechFax service
Ordering parts	Technical support service, TechConnect BBS
Software update information	TechFax service
System board layouts	TechFax service, <i>Installation and Troubleshooting Guide</i>
Technical notes on system compatibility and revisions	TechFax service
Technical training class information	TechFax service
Technical specifications	TechFax service, <i>User's Guide</i>
Troubleshooting, step-by-step instructions	<i>Installation and Troubleshooting Guide</i> , Dell system diagnostics, AutoTech service
Unresolved problems requiring assistance from a Dell technician	Technical support service, TechConnect BBS

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

System Documentation

The system documentation shipped with the system includes information about installing hardware, software support utilities, and video drivers and about using the System Setup program.

World Wide Web on the Internet

Dell can be accessed electronically on the Internet via a World Wide Web site, a file transfer protocol (FTP) site, and electronic mail (e-mail) using the following addresses:

- World Wide Web
<http://www.dell.com/>

- Anonymous FTP
<ftp.dell.com/>
Log in as user : anonymous, and use your e-mail address as your password.
- Electronic Support Service
support@dell.com
- Electronic Quote Service
sales@dell.com
- Electronic Information Service
info@dell.com

Commercial Online Services

Dell can also be accessed electronically via commercial online services, such as CompuServe®, PRODIGY®, America Online, and the Microsoft Network, by using the following addresses:

- CompuServe
Type GO DELL.
- PRODIGY
Select **MANUFACTURER'S CORNER**; then select **DELL**.
- America Online
Use the keyword DELL.
- Microsoft Network
From the Edit menu, select **GO TO**, select **OTHER PLACES**, and then type DELL.

Dell Diagnostics Program

Every Dell computer comes with Dell diagnostics that can help you determine what is wrong with the computer when it does not operate correctly. This program provides valuable information for you and for Dell technicians should you need to call Dell.

See Chapter 5, “Running the System Diagnostics,” for instructions on using the diagnostics. You can use this diagnostic program to test major components or devices in the computer, if it can boot.

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers.

When you call AutoTech, you use your touch-tone telephone to select the subjects that correspond to your questions. You can even interrupt an AutoTech session and continue the session later. The code number that the AutoTech service gives you allows you to continue your session where you ended it.

The information available through AutoTech includes:

- Specifications and prices for Dell computers currently on sale
- Installation instructions for Dell computers and peripherals

- Answers to questions about the Microsoft Windows 3.x operating systems
- Help in troubleshooting Dell computers

The AutoTech service is available 24 hours a day, seven days a week. You can also access this service through the technical support service. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

NOTE: AutoTech is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

TechFax Service

Dell takes full advantage of fax technology to serve you better. Twenty-four hours a day, seven days a week, you can call the Dell TechFax line toll-free for all kinds of technical information.

Using a touch-tone phone, you can select from a full directory of topics. The technical information you request is sent within minutes to the fax number you designate. TechFax information includes:

- Interrupt maps, system board layouts, and specifications.
- Technical notes on system compatibility and revisions.
- News on updates for operating systems and application programs.
- Descriptions of available technical training classes. For Dell-certified technicians, TechFax offers information such as parts lists, drawings, and maintenance and repair data.

For the TechFax telephone number, see “Dell Contact Numbers” found later in this chapter.

NOTE: TechFax is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

TechConnect BBS

Use a modem to access Dell's TechConnect BBS 24 hours a day, seven days a week. The service is menu-driven and fully interactive. The modem settings for the BBS are 8 bit, no parity, 1 stop bit.

You can use the BBS to do the following:

- Send questions to a Dell technician
- Request a follow-up call or leave a message for a Dell technical support specialist
- Order parts
- Download basic input/output system (BIOS) and video driver upgrades
- Download updates

For the BBS telephone number, see “Dell Contact Numbers” found later in this chapter.

NOTE: The TechConnect BBS is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

Automated Order-Status System

You can call this automated service to check on the status of any Dell products that you have ordered. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

Technical Support Service

Dell’s industry-leading hardware technical support service is open 24 hours a day, seven days a week, for the life of the system. At any hour of any day, a Dell technical expert is ready with the answers to your questions about Dell hardware.

Our technical support staff pride themselves on their track record: more than 90 percent of all problems and questions are taken care of in just one toll-free call, usually in less than ten minutes. When you call, our experts can refer to records we keep on your specific Dell system to better understand your particular question. Our technical support staff use computer-based diagnostics to provide fast, accurate answers to your questions.

If possible, turn the system on before you call Dell and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer itself.

Make sure the computer’s system documentation is available. You should also have a flat-blade screwdriver or a quarter-inch nut driver available.

WARNING: If you need to remove the computer covers, be sure to first disconnect the computer system’s power and modem cables from all electrical outlets.

To contact Dell’s technical support service, call the number for your country as listed in “Dell Contact Numbers” found later in this chapter. (For information about receiving technical assistance in the U.K., refer to the *Placing a Service Call* card that came with the computer.)

NOTE: Technical support services may vary outside the continental U.S. Contact your local Dell representative for more information.

Problems With an Order

If you have a problem with an order, such as missing parts, wrong parts, or incorrect billing, contact Dell Computer Corporation for customer assistance. Have the invoice or packing slip handy when you call. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

Product Information

If you need information about additional products available from Dell Computer Corporation, or if you would like to place an order, a sales specialist will be glad to help. For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. **Call Dell to obtain an authorization number, and write it clearly and prominently on the outside of the box.**

For the telephone number to call, see “Dell Contact Numbers” found later in this chapter.

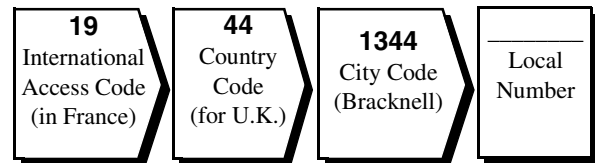
2. **Include a copy of the invoice and a letter describing the reason for the return.**
3. **Include a copy of the Diagnostics Checklist indicating the tests you have run and any error messages reported by the Dell diagnostics.**
4. **Include any accessories that belong with the item(s) being returned (power cables, software diskettes, guides, and so on) if the return is for credit.**
5. **Pack the equipment to be returned in the original (or equivalent) packing materials.**

Include return shipping expenses. You are responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell Computer Corporation. Collect on delivery (C.O.D.) packages are not accepted.

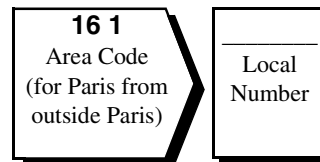
Dell Contact Numbers

When you need to contact Dell, use the telephone numbers and codes provided in Tables 11-2 and 11-3. Table 11-2 provides the various codes required to make long-distance and international calls. Table 11-3 provides local telephone numbers, area codes, and toll-free numbers, if applicable, for each department or service available in various countries around the world. If you are making a direct-dialed call to a location outside of

your local telephone service area, determine which codes to use (if any) in Table 11-2 in addition to the local numbers provided in Table 11-3. For example, to place an international call from Paris, France to Bracknell, England, dial the international access code for France followed by the country code for the U.K., the city code for Bracknell, and then the local number as shown in the following illustration.



To place a long-distance call within your own country, use area codes instead of international access codes, country codes, and city codes. For example, to call Paris, France from Montpellier, France, dial the area code plus the local number as shown in the following illustration.



The codes required depend on where you are calling from as well as the destination of your call; in addition, each country has a different dialing protocol. If you need assistance in determining which codes to use, contact a local or an international operator.

NOTE: Toll-free numbers are for use only within the country for which they are listed. Area codes are most often used to call long distance within your own country (not internationally)—in other words, when your call originates in the same country you are calling.

Table 11-2. International Dialing Codes

Country (City)	International Access Code	Country Code	City Code
Australia (Sydney)	0011	61	2
Austria (Vienna)	900	43	1
Belgium (Brussels)	00	32	2
Canada (North York, Ontario)	011	—	Not required
Czech Republic (Prague)	00	42	2
Denmark (Horsholm)	009	45	Not required
Finland (Helsinki)	990	358	0
France (Paris) (Montpellier)	19	33	(1) (67)
Germany (Langen)	00	49	6103
Hong Kong	001	852	Not required
Ireland (Bray)	16	353	1
Italy (Milan)	00	39	2
Japan (Tokyo)	001	81	3
Korea (Seoul)	001	82	2
Luxembourg	00	—	—
Malaysia (Penang)	007	60	—
Mexico (Colonia Granada)	95	52	5
Netherlands (Amsterdam)	00	31	20
New Zealand	00	64	—
Norway (Lysaker)	095	47	Not required
Poland (Warsaw)	011	48	22
Singapore (Singapore)	005	65	Not required
South Africa (Johannesburg)	09/091	27	11

Table 11-2. International Dialing Codes (Continued)

Country (City)	International Access Code	Country Code	City Code
Spain (Madrid)	07	34	1
Sweden (Upplands Vasby)	009	46	8
Switzerland (Geneva)	00	41	22
U.K. (Bracknell)	010	44	1344
U.S. (Austin, Texas)	011	1	Not required

Table 11-3. Dell Contact Numbers

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Australia (Sydney)	Customer Technical Support		toll free: 1-800-808-378
	Customer Care		toll free: 1-800-819-339
	Sales		toll free: 1-800-808-312
	Fax		toll free: 1-800-818-341
Austria* (Vienna)	Switchboard		0224334100-0
	Technical Support		0660-8779
Belgium* (Brussels)	Customer Technical Support		toll free: 0800 14856
	Customer Service	02	.466 91 99
	Sales		toll free: 0800 16884
	SalesFax	02	.466 47 89
	TechFax (International call to the Netherlands)		.00 31 206829106
	TechConnect BBS (International call to the Netherlands).		.00 31 206866504

* For technical assistance in this country after normal working hours, use one of the following numbers:
(353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Canada (North York, Ontario) <i>NOTE: Customers in Canada call the U.S. for access to TechConnect BBS.</i>	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support).		toll free: 1-800-247-9362
	Customer Care (From outside Toronto).		toll free: 1-800-387-5759
	Customer Care (From within Toronto)	416	758-2400
	Customer Technical Support (From outside Toronto)		toll free: 1-800-387-5757
	Customer Technical Support (From within Toronto).	416	758-2300
	Customer Account Services (Credit Return Authorization Numbers)		toll free: 1-800-387-5759
	Sales (Direct sales—from outside Toronto).		toll free: 1-800-387-5752
	Sales (Direct sales—from within Toronto)	416	758-2200
	Sales (Software and peripherals)		toll free: 1-800-667-7345
	Sales (Federal government, education, and medical)		toll free: 1-800-567-7542
	Sales (Major accounts)		toll free: 1-800-387-5755
	TechConnect BBS	512	728-8528
	TechFax		toll free: 1-800-950-1329
Czech Republic* (Prague)	Technical Support	02	8728 221
	Customer Service and Sales.	02	879250
	TechConnect BBS	02	.66710274

* For technical assistance in this country after normal working hours, use one of the following numbers:
(353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Denmark* (Horsholm)	Customer Care, Technical Support, and Sales		toll free: 800 171 62
Finland* (Helsinki)	Customer Support and Technical Support		toll free: 0800-534 55
	Sales		toll free: 0800-33 55
France* (Paris/Montpellier)	Technical Support (Paris)	16 1	47 62 68 90 67 06 62 86
	Customer Care (Paris)	16 1	47 62 69 39
	Customer Care (Fax) (Paris)	16 1	47 62 60 03
	Customer Care (Fax) (Montpellier)	16	06 60 03
	TechFax (Montpellier)	16	22 53 11
	TechConnect BBS (Montpellier)	16	22 53 04
	Sales (Major accounts) (Paris)	16 1	47 62 69 00
	Direct Sales (Paris)	16 1	47 62 68 50 47 62 68 68
	Corporate Sales (Paris)	16 1	47 62 69 00
Germany* (Langen)	Customer Technical Support	06103	971-200
	Customer Care	06103	971-500
	TechConnect BBS	06103	971-666
	Sales	06103	971-460
Hong Kong	Customer Technical Support		toll free: 800 4107
	Sales		toll free: 800 4109

* For technical assistance in this country after normal working hours, use one of the following numbers:
(353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Ireland* (Bray)	Customer Technical Support		1-850-543-543
	Sales		1-850-235-235
	SalesFax	01	286 2020
	Fax	01	286 6848
	TechConnect BBS	01	204 4761
	TechFax	01	204 4044
	Switchboard	01	286 0500
Italy* (Milan)	Switchboard		215.69.530
	Fax		215.69.444
Japan (Tokyo)	Technical Support	03	5466-3386
			toll free: 0120-1984-39
	Customer Care		03-5466-4750
	Sales		03-5466-6200
Korea (Seoul)	Technical Support		toll free: 080-200-3800
	Customer Service and Sales		toll free: 080-200-3600
	Fax		394 3122
	Switchboard		287 5600
Latin America <i>NOTE: Customers in Latin America call the U.S. for sales and technical assistance.</i>	Customer Technical Support	512	728-4093
	Customer Service	512	728-3619
	Fax (Technical Support and Customer Service)	512	728-3883
	Sales	512	728-4397
	SalesFax	512	728-4600
			728-3772

* For technical assistance in this country after normal working hours, use one of the following numbers:
(353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Luxembourg* <i>NOTE: Customers in Luxembourg call Belgium for sales, customer assistance, and technical assistance, and they call the Netherlands for the SalesFax, TechFax, and TechConnect BBS services.</i>	Customer Technical Support (Brussels, Belgium)		toll free: 0800 2109
	Customer Service (Brussels, Belgium)	02	466 91 99
	Sales (Brussels, Belgium)		toll free: 0800 16884
	SalesFax (Brussels, Belgium)	02	466 47 89
	TechFax (Amsterdam, Netherlands)		682 91 06
	TechConnect BBS (Amsterdam, Netherlands)		686 65 04
Malaysia (Penang)	Customer Technical Support		toll free: 800 8298
	Sales		toll free: 800 8202
Mexico (Colonia Granada) <i>NOTE: Customers in Mexico call the U.S. for access to the Automated Order-Status System and AutoTech.</i>	Automated Order-Status System (U.S.)	512	728-0685
	AutoTech (U.S.) (Automated technical support)	512	728-0686
	Customer Technical Support	525	228-7870
	Sales	525	228-7811
			toll free: 91-800-900-37
			toll free: 91-800-904-49
	Customer Service	525	228-7878
	Main	525	228-7800
Netherlands* (Amsterdam)	Customer Technical Support		toll free: 06-0996663
	Direct Sales		toll free: 06-0663
	Direct SalesFax	020	682 7171
	Corporate Sales	020	581 8818
	Corporate SalesFax	020	686 8003
	TechFax	020	682 9106
	TechConnect BBS	020	686 6504

* For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
New Zealand	Technical Support		0800 446 255
	Sales		0800 441 567
	Fax		0 800 441 566
Norway* (Lysaker)	Customer Technical Support and Customer Service		22-67 50 00
	Sales		67-125 711
Poland* (Warsaw)	Switchboard		620-7898
	Fax		620-4584
Singapore (Singapore)	Customer Technical Support		toll free: 800 6011 051
	Sales		toll free: 800 6011 054
South Africa (Johannesburg)	Switchboard		011 447-7567
	Fax		011 447 7549
Southeast Asian/ Pacific Countries (excluding Australia, Hong Kong, Japan, Malaysia, New Zealand, and Singapore—see individual listings for these countries)	Customer Technical Support		60 4 810-4977
	Sales		60 4 810-4988
Spain* (Madrid)	Technical Support	91	902.100.130
	Customer Service	91	329 10 80
	TechConnect BBS	91	329 33 53
	Sales	91	902.100.185
	Switchboard	91	329 10 80

* For technical assistance in this country after normal working hours, use one of the following numbers:
(353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
Sweden* (Upplands Vasby)	Technical Support	08	590 05 199
	Customer Care	08	590 05 169
	TechConnect BBS	08	590 05 591
	Sales	08	590 05 185
Switzerland* (Geneva)	Technical Support (Swiss French)	022	979 01 50
	Technical Support (Swiss German)	022	979 01 55
	TechConnect BBS	022	979 01 88 979 01 89
	Customer Service	022	979 01 50
U.K.* (Bracknell)	Customer Technical Support (Dell Dimension™ systems)	01344	720109
	Customer Technical Support (Other systems)	01344	723723
	Customer Care	01344	720110
	TechFax	01344	723178
	TechConnect BBS	01344	723858
	Sales	01344	720000

* For technical assistance in this country after normal working hours, use one of the following numbers:
(353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.).

Table 11-3. Dell Contact Numbers (Continued)

Country	Department Name or Service	Area Code	Local Number or Toll-Free Number
U.S. (Austin, Texas)	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support).		toll free: 1-800-247-9362
	Customer Technical Support (Return Material Authorization Numbers—warranty repairs)		toll free: 1-800-624-9896
	Dell Customer Service (Credit Return Authorization Numbers).		toll free: 1-800-624-9897
	Dell Sales		toll free: 1-800-247-4618
	DellWare®		toll free: 1-800-753-7201
	DellWare FaxBack Service	512	728-1681
	Fee-Based Technical Support		toll free: 1-800-433-9005
	Sales (Catalogs)		toll free: 1-800-426-5150
	Spare Parts Sales:		
	Dell Direct ¹		toll free: 1-800-274-1490
	Major Accounts ²		toll free: 1-800-357-3355
	Fax		toll free: 1-800-727-8320
	TechFax		toll free: 1-800-950-1329
	TechConnect BBS	512	728-8528
	Switchboard	512	338-4400

¹ Use this telephone number if your call is about a system purchased for home, personal, or small-business use.

² Use this telephone number if you are calling for an established Dell national account (have your account number handy), if you work for a governmental agency (local, state, or federal), or if you work for an educational or medical institution.

Appendix A

Diagnostics Checklist

Before You Call...

Keep a record of your diagnostic and troubleshooting activities by photocopying the following checklist and filling it out whenever you experience a problem with your computer system.

If you need to call Dell Computer Corporation for assistance, you will be able to inform the support technician of the actions you have taken to resolve the problem. If you must return a piece of hardware to Dell, include this filled-out checklist. (See Chapter 11, “Getting Help,” for information on obtaining technical assistance.)

Be sure to save the following checklist in this appendix as a master, so you can use it to make copies of the checklist as needed.

Diagnostics Checklist

Name: _____			Date: _____		
Address: _____			Phone no.: _____		
Service tag (bar code on the back of the computer): _____					
Return Material Authorization Number (if provided by support technician): _____					
Operating system and version: _____					
Peripherals: _____ _____ _____					
Expansion cards: _____ _____ _____					
Are you connected to a network?			☐ yes	☐ no	
Network, version, and network card: _____					
Programs and versions: _____					
Start-up file contents:	autoexec.bat		config.sys		
_____	_____		_____		
_____	_____		_____		
Error message or beep code: _____					
Description of problem and troubleshooting procedures you performed: _____ _____ _____ _____ _____					

Appendix B

Diagnostic Video Tests

The Video Test Group of the system diagnostics consists of the following seven tests, each of which verifies a particular video function or group of functions:

- Video Memory Test — Checks the integrity of characters generated from data in the video memory.
- Video Hardware Test — Checks the functions of the cursor register and the horizontal and vertical retrace bit registers.
- Text Mode Character Test — Checks the video subsystem's ability to present text mode data.
- Text Mode Color Test — Checks the video subsystem's ability to present color in text modes.
- Text Mode Pages Test — Checks the video subsystem's ability to map and present all available video text pages on the monitor screen, one page at a time.
- Graphics Mode Test — Checks the video subsystem's ability to present graphics mode data and colors.
- Color Palettes Test — Checks the video subsystem's ability to display all available colors.
- Solid Colors Test — Checks the video subsystem's ability to show screens full of solid colors. Allows you to check for missing color subpixels.

All of these tests, except the Video Memory Test and the Video Hardware Test, are interactive. These interactive tests display images on the monitor screen and require the user to respond with the following steps:

1. **Examine a displayed image for correctness.**
2. **If an image is correct, type y.**
3. **If an image is incorrect, type n.**

The following sections describe each of the tests in the Video Test Group.

Video Memory Test

The Video Memory Test verifies the integrity of the video memory either on the system board or on a video expansion card. As the test runs, it describes which 64-kilobyte (KB) block of video memory is being tested. When a test is complete, a message indicates whether the video memory has passed or failed the test. This test does not require any interaction on your part.

Video Hardware Test

The Video Hardware Test verifies the operation of the cursor registers and the horizontal and vertical retrace bit registers. When a test is complete, a message indicates whether these registers have passed or failed the test. This test does not require any interaction on your part.

Text Mode Character Test

The Text Mode Character Test consists of a group of subtests that display printable characters and character attributes. The subtests check character quality and the monitor's ability to display the characters correctly on its screen. A prompt at the bottom of each screen asks the user to decide whether the display is satisfactory and to respond by typing y or n.

If you respond affirmatively to each subtest, the Text Mode Character Test passes. A negative response to any subtest causes the test to fail.

The following subsections describe the subtests of the Text Mode Character Test in the order in which they appear.

Character Attributes Subtest (80 x 25)

The 80-column x 25-line character attributes subtest displays four lines of text that demonstrate normal-intensity video, reverse video, intensified video, and blinking video.

Character Set Subtest (80 x 25)

The 80-column x 25-line character set subtest displays all 256 characters in the American Standard Code for Information Interchange (ASCII) character set in 80-column by 25-line text mode. Figure B-1 shows an example of the character set subtest screen.

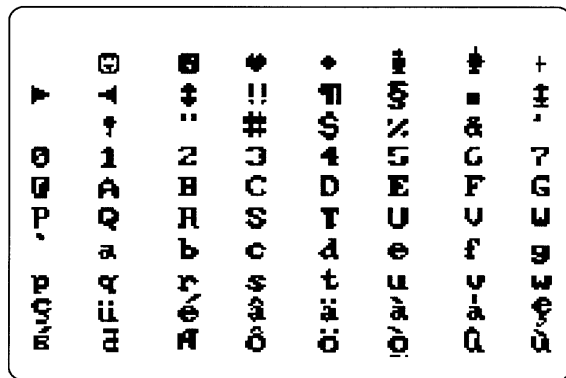


Figure B-1. 80-Column x 25-Line Character Set Subtest Screen

Character Attributes Subtest (40 x 25)

The 40-column x 25-line character attributes subtest displays four lines of text in 40-column by 25-line (double-wide) text mode that demonstrate normal-intensity video, reverse video, intensified video, and blinking video.

Character Set Subtest (40 x 25)

The 40-column x 25-line character set subtest displays all 256 characters in the ASCII character set in 40-column by 25-line (double-wide) text mode. Figure B-2 shows an example of the 40-column x 25-line character set subtest screen.

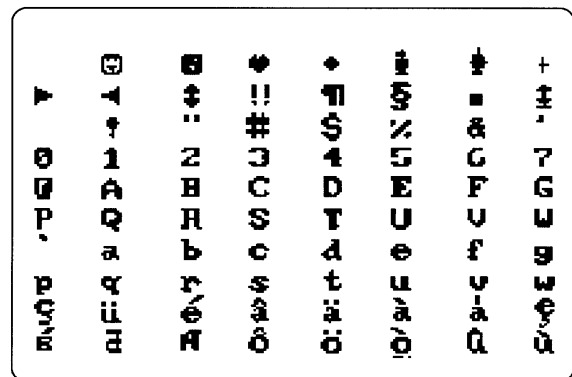


Figure B-2. 40-Column x 25-Line Character Set Subtest Screen

Text Mode Color Test

The Text Mode Color Test contains three subtests that check the video subsystem's ability to present color in text modes. The following subsections describe these subtests.

NOTE: These subtests are valid for color monitors only.

Color Attributes Subtest (80 x 25)

The 80-column x 25-line color attributes subtest displays a pattern of 16 rows and 16 columns in 80-column by 25-line text mode. Each row has a hexadecimal number in a unique foreground color and each column has a unique background color. Where the same foreground and background color intersect, the hexadecimal number is not visible. Type y if each character is displayed correctly; otherwise, type n. Table B-1 indicates the color in each of the rows and columns.

Table B-1. Color Attributes

Row or Column Color	Foreground Color	Background Number
0	black	black
1	blue	blue
2	green	green
3	cyan	cyan
4	red	red
5	magenta	magenta
6	brown	brown
7	white	white
8	dark gray*	black
9	light blue*	blue
A	light green*	green
B	light cyan*	cyan
C	light red*	red
D	light magenta*	magenta
E	yellow*	brown
F	intense white*	white

* These colors blink during the test.

Color Attributes Subtest (40 x 25)

The 40-column x 25-line color attributes subtest is the same as the previous subtest except that the characters are displayed in 40-column by 25-line (double-wide) text mode. Type y if each character is displayed correctly; otherwise, type n.

Color Bars Subtest

The color bars subtest displays 16 bars in different colors with background intensity enabled. Under each bar is the name of the color that should be displayed. Type y if each color bar is displayed correctly; otherwise, type n.

Text Mode Pages Test

The Text Mode Pages Test checks the video subsystem's ability to map and present all available video pages on the monitor screen, one page at a time. The test displays eight successive screens, the first of which contains 21 lines of 77 zeros. The remaining seven screens are identical to the first, except that each screen substitutes a different numeral (1 through 7) for the zeros.

Type y if all the rows of numbers on each screen are displayed correctly; otherwise, type n.

Graphics Mode Test

The Graphics Mode Test checks the video subsystem's ability to present graphics mode data and colors. This test displays nine different screens, each of which allows you to check some aspect of graphics mode data and colors. The following subsections describe Graphics Mode Test screens in the order in which they appear.

NOTE: Some of the following tests may not appear if your system does not support the video mode being tested.

320 x 200 Graphics Mode Screens

The Graphics Mode Test displays two successive 320- x 200-pixel graphics mode screens: The first screen displays three pyramids in red, green, and yellow. The second screen displays three pyramids in magenta, cyan, and white. Type y if all the pyramids are the correct colors; otherwise, type n.

640 x 200 Black/White Graphics Mode Screen

The 640- x 200-pixel black/white graphics mode screen displays a black rectangle and a white rectangle on a gray background. Type y if the boxes are displayed correctly; otherwise, type n.

640 x 480 Monochrome Graphics Mode Screen

The 640- x 480-pixel monochrome graphics mode screen displays three chess pieces. Type y if all the chess pieces are identical and displayed correctly; otherwise, type n. Figure B-3 shows an example of this screen.



Figure B-3. 640 x 480 Monochrome Graphics Mode Screen

320 x 200 16-Color Graphics Mode Screen

The 320- x 200-pixel 16-color graphics mode screen displays a series of Xs in 16 different colors with the name of the color beneath each X. Type y if all the Xs are the correct colors; otherwise, type n.

640 x 200 16-Color Graphics Mode Screen

The 640- x 200-pixel 16-color graphics mode screen displays a series of hexagons in 16 different colors with the name of the color beneath each hexagon. Type y if all the hexagons are the correct colors; otherwise, type n.

640 x 350 16-Color Graphics Mode Screen

The 640 x 350 16-color graphics mode screen displays a series of octagons in 16 different colors with the name of the color displayed beneath each octagon. Type y if all the octagons are the correct colors; otherwise, type n.

640 x 480 2-Color Graphics Mode Screen

The 640- x 480-pixel 2-color graphics mode screen displays three chess pieces. Type y if all the chess pieces are identical and displayed correctly; otherwise, type n. Figure B-4 shows an example of this screen.

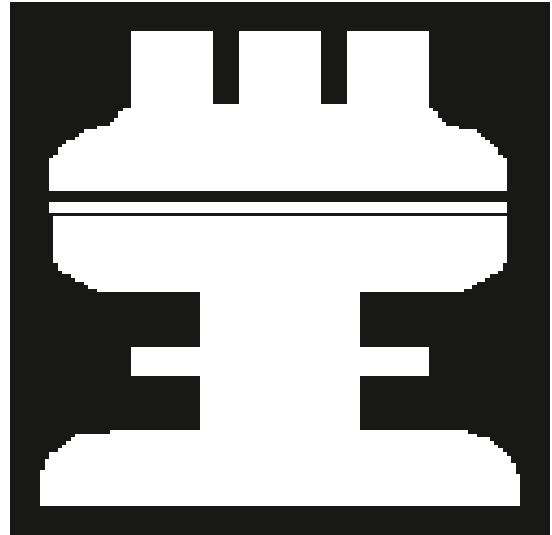


Figure B-4. 640 x 480 2-Color Graphics Mode Screen

640 x 480 16-Color Graphics Mode Screen

The 640- x 480-pixel 16-color graphics mode screen displays a series of stars in 16 different colors with the name of the color beneath each star. Type y if all the stars are the correct colors; otherwise, type n.

320 x 200 256-Color Graphics Mode Screen

The 320- x 200-pixel 256-color graphics mode screen displays a series of squares in 256 different color hues and intensities. Type *y* if all the squares are the correct colors; otherwise, type *n*.

640 x 480 256-Color Graphics Mode Screen

The 640- x 480-pixel 256-color graphics mode screen displays a series of squares with two colors in each square. Type *y* if all the squares appear to be correct; otherwise, type *n*.

800 x 600 16-Color Graphics Mode Screen

The 800- x 600-pixel 16-color graphics mode screen displays a series of pyramids in 16 different colors. Type *y* if all the pyramids appear to be correct; otherwise, type *n*.

800 x 600 256-Color Graphics Mode Screen

The 800- x 600-pixel 256-color graphics mode screen displays a series of squares with four colors in each square. Type *y* if all the squares appear to be correct; otherwise, type *n*.

1024 x 768 16-Color Graphics Mode Screen

The 1024- x 768-pixel 16-color graphics mode screen displays a series of hourglasses in 16 different colors. Type *y* if all the hourglasses appear to be correct; otherwise, type *n*.

1024 x 768 256-Color Graphics Mode Screen

The 1024- x 768-pixel 256-color graphics mode screen displays a series of asterisks with four colors in each asterisk. Type *y* if all the asterisks appear to be correct; otherwise, type *n*.

1280 x 1024 16-Color Graphics Mode Screen

The 1280- x 1024-pixel 16-color graphics mode screen displays a series of squares in 16 different colors located in various positions on the screen. Type *y* if all the squares appear to be correct; otherwise, type *n*.

Color Palettes Test

The Color Palettes Test checks the video subsystem's ability to display all available colors. The test displays two screens that allow you to check the quality of different shades of the basic colors and to test the monitor's ability to vary the intensity of these colors.

The first screen contains four sets of 64 squares, one for gray and one for each of the three basic colors (red, green, and blue). Each square contains a different shade of its associated color, ranging from very light to very dark. Type *y* if all the squares are the correct colors; otherwise type *n*.

The second screen is the red/green/blue (RGB) color combination screen. This screen allows you to test the monitor's ability to increase or decrease the intensity of the three basic colors.

The RGB color combination screen displays an RGB box in the top center of the screen with individual red, green, and blue boxes beneath it. Underneath the individual color boxes are three lines that show the intensity of each color. Type *r*, *g*, or *b* to adjust the intensity of the corresponding color; then press the right-arrow key to increase the color intensity, or press the left-arrow key to decrease the intensity. The RGB box should be able to display 262,144 different colors when you adjust the intensity levels of red, green, and blue. Type *y* if all the squares are the correct colors; otherwise type *n*.

Appendix C

Jumpers and Switches

This appendix provides specific information about the jumpers on the system board. It also provides some basic information on jumpers and switches and describes the connectors and sockets on the various boards in the computer.

Jumpers and Switches— A General Explanation

Jumpers and switches provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring the system, you may need to change jumper settings on the system board. You may also need to change jumper and/or switch settings on expansion cards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them.

Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit.

To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.



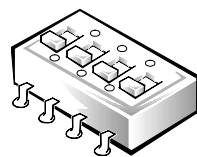
CAUTION: Make sure the system is turned off before you change a jumper setting. Otherwise, damage to the system or unpredictable results may occur.

A jumper is referred to as *open* or *unjumpered* when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as *jumpered*. The jumper setting is often shown in text as two numbers, such as 1-2. The number 1 is printed on the circuit board so that you can identify each pin number based on the location of pin 1.

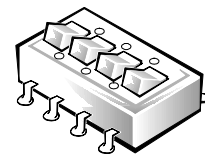
Figure C-1 shows the location and default settings of the jumper blocks on the system board. See Table C-1 for the designations, default settings, and functions of the system's jumpers.

Switches

Switches control various circuits or functions in the computer system. The switches you are most likely to encounter are dual in-line package (DIP) switches, which are normally packaged in groups of two or more switches in a plastic case. Two common types of DIP switches are *slide* switches and *rocker* switches (see the following illustration).



slide switches



rocker switches

Each of these switches has two positions, or *settings* (usually *on* and *off*). To change the setting of a slide switch, use a small, pointed object such as a small screwdriver or a straightened paper clip to slide the switch to the proper position. To change the setting of a rocker switch, use the screwdriver or paper clip to press down

on the appropriate side of the switch. In either case, do not use a pen, pencil, or other object that might leave a residue on the switch.

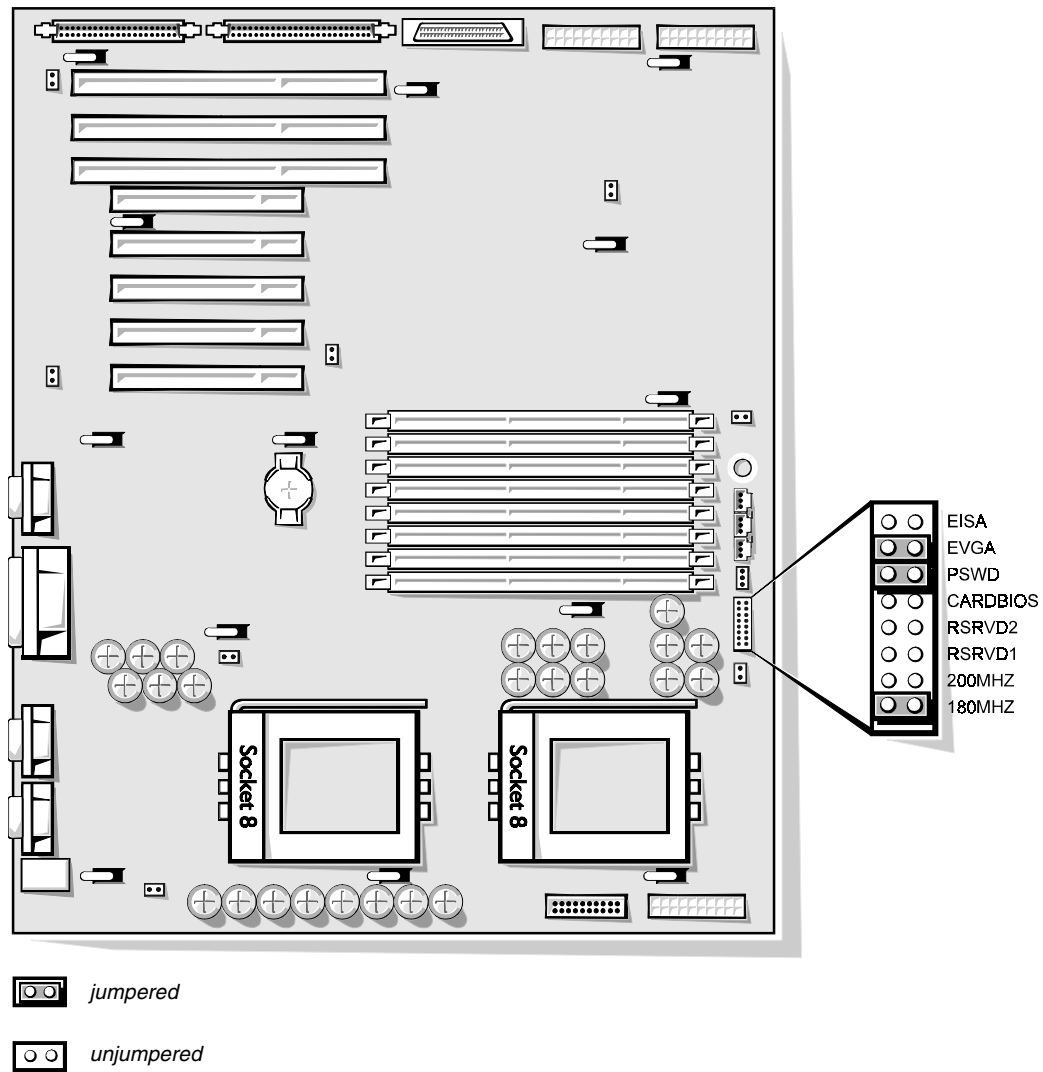


Figure C-1. System Board Jumpers

Table C-1. System-Board Jumper Settings

Jumper	Setting		Description
EISA		(default)	The EISA Configuration Utility settings are retained at system boot.
			The EISA Configuration Utility settings are cleared at next system boot. (If the EISA Configuration Utility becomes corrupted to the point where the system won't boot, install the jumper plug and boot the system. Remove the jumper before restoring the EISA configuration information.)
EVGA		(default)	The integrated video controller is enabled.
			The integrated video controller is disabled.
PSWD		(default)	The password feature is enabled.
			The password feature is disabled.
CARDBIOS			Reserved (<i>do not change</i>).
RSRVD2			Reserved (<i>do not change</i>).
RSRVD1			Reserved (<i>do not change</i>).
200MHZ*			The microprocessor's internal speed is 200 MHz.
180MHZ*			The microprocessor's internal speed is 180 MHz.

* Only one of these jumpers should have a jumper plug installed.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table C-1. System-Board Jumper Settings

Jumper	Setting	Description
 <i>jumpered</i>	 <i>unjumpered</i>	

System Board Labels

Table C-2 lists the connectors and sockets located on the system board. Table C-3 lists the connectors on the SCSI backplane board.

Table C-2. System Board Connectors and Sockets

Connector or Socket	Description
BATTERY	Battery connector
DIMM <i>x</i>	DIMM socket
EISA <i>n</i>	EISA expansion-card connector
FAN <i>n</i>	Fan connector
FLOPPY	Diskette/tape drive interface connector
KEYBOARD	Keyboard connector
MONITOR	Video connector
MOUSE	Mouse connector
PARALLEL	Parallel port connector; sometimes referred to as <i>LPT1</i>
PCI <i>n</i>	PCI expansion-card connector
POWER <i>n</i>	Power input connector
PROCESSOR1	Microprocessor socket
PROCESSOR2	Microprocessor socket
REMOTE	Server-management serial port connector
SCSI CD-ROM	Ultra/Narrow SCSI host adapter connector
SCSI BACKPLANE	Ultra/Wide SCSI host adapter connector
SERIAL <i>n</i>	Serial port connector; sometimes referred to as <i>COM1</i> and <i>COM2</i>
SMB BACKPLANE	Server-management bus connector

Table C-2. System Board Connectors and Sockets (Continued)

Connector or Socket	Description
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NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Table C-3. SCSI Backplane Board Connectors

Connector	Description
DRIVE _n	Hard-disk drive carrier connector
PANEL	Control panel connector
POWER	Power input connector
SCSI	Ultra/Wide SCSI cable connector
SMB	Server-management bus connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list.

Disabling a Forgotten Password

The computer's software security features include a supervisor password and a user password, which are discussed in detail in Chapter 4, "Using the System Setup Program," of the system *User's Guide*. A password jumper on the system board enables these password features or disables them and clears any password(s) currently in use.

To disable a forgotten supervisor password or user password, a trained service technician must perform the following steps:

1. Remove the computer covers.

See "Removing the Computer Covers" in Chapter 7 for instructions.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. Refer to "Jumpers and Switches—A General Explanation" found earlier in this appendix for jumper information.

Figure C-1 shows the location of the password jumper (labeled "PSWD") on the system board.

3. Remove the jumper plug from the PSWD jumper.

4. Replace the computer cover, reconnect the computer to its power source, and turn it on.

The existing passwords are not disabled (erased) until the system boots with the PSWD jumper plug removed. However, before you assign a new system and/or user password, you must install the jumper plug.

NOTE: If you assign a new system and/or user password with the jumper plug still removed, the system disables the new password(s) the next time it boots.

5. Repeat step 1.

6. Install the jumper plug on the PSWD jumper.

7. Replace the computer cover, reconnect the computer and peripherals to their power sources, and turn them on.

8. Have the user assign a new system and/or user password.

To assign a new supervisor password using the System Setup program, see “Assigning a Supervisor Password” in Chapter 4 of the system *User’s Guide*.

To assign a new supervisor password using the EISA Configuration Utility, see “Assigning or Changing a Supervisor Password” in Chapter 5 of the system *User’s Guide*.

To assign a new user password using the System Setup program, see “Assigning a User Password” in Chapter 4 of the system *User’s Guide*. To assign a new user password using the EISA Configuration Utility, see “Assigning or Changing a User Password” in Chapter 5 of the system *User’s Guide*.

Abbreviations and Acronyms

Abbreviation or Acronym	Description	Abbreviation or Acronym	Description
A	ampere(s)	CGA	color graphics adapter
AC	alternating current	cm	centimeter(s)
ADC	analog-to-digital converter	CMOS	complementary metal-oxide semi-conductor
ADI	Autodesk Device Interface	C.O.D.	collect on delivery
AI	artificial intelligence	cpi	characters per inch
ANSI	American National Standards Institute	cpl	characters per line
ASCII	American Standard Code for Information Interchange	CPU	central processing unit
ASIC	application-specific integrated circuit	DAC	digital-to-analog converter
BASIC	Beginner's All-Purpose Symbolic Instruction Code	DASH	Dell Advanced SCSI Host
BIOS	basic input/output system	DAT	digital audio tape
bpi	bits per inch	dB	decibel(s)
bps	bits per second	dBA	adjusted decibel(s)
BTU	British thermal unit	DC	direct current
BZT	<i>Bundesamt für Zulassungen in der Telekommunikation</i>	DIN	<i>Deutsche Industrie Norm</i>
C	Celsius	DIP	dual in-line package
CCFT	cold cathode fluorescent tube	DMA	direct memory access
CD	compact disc	DOC	Department of Communications (in Canada)
CD-ROM	compact disc read-only memory	dpi	dots per inch
		DRAM	dynamic random-access memory

Abbreviation or Acronym	Description
DS/DD	double-sided double-density
DS/HD	double-sided high-density
DSA	Dell SCSI Array
ECC	error correction code
EDO	extended-data out
EGA	enhanced graphics adapter
EIDE	enhanced integrated drive electronics
EISA	Extended Industry-Standard Architecture
EMI	electromagnetic interference
EMM	expanded memory manager
EMS	Expanded Memory Specification
EPP	Enhanced Parallel Port
EPROM	erasable programmable read-only memory
ESD	electrostatic discharge
ESDI	enhanced small-device interface
F	Fahrenheit
FAT	file allocation table
FCC	Federal Communications Commission
FIFO	first-in first-out
ft	feet
g	gram(s)
G	gravities
GB	gigabyte(s)
GUI	graphical user interface

Abbreviation or Acronym	Description
h	hexadecimal
HIP	Hardware Instrumentation Program
HMA	high memory area
HPFS	High Performance File System
Hz	hertz
I/O	input/output
ID	identification
IDE	integrated drive electronics
IRQ	interrupt request
ISA	Industry-Standard Architecture
JEIDA	Japanese Electronic Industry Development Association
K	kilo- (1024)
KB	kilobyte(s)
KB/sec	kilobyte(s) per second
Kbit(s)	kilobit(s)
Kbit(s)/sec	kilobit(s) per second
kg	kilogram(s)
kHz	kilohertz
LAN	local area network
lb	pound(s)
LCD	liquid crystal display
LED	light-emitting diode
LIF	low insertion force
LN	load number
LIM	Lotus/Intel/Microsoft

Abbreviation or Acronym	Description
lpi	lines per inch
m	meter(s)
mA	milliampere(s)
mAh	milliampere-hour(s)
MB	megabyte(s)
MBR	master boot record
MDA	monochrome display adapter
MGA	monochrome graphics adapter
MHz	megahertz
mm	millimeter(s)
ms	millisecond(s)
MS-DOS	Microsoft Disk Operating System
MTBF	mean time between failures
mV	millivolt(s)
NIC	network interface controller
NiCad	nickel cadmium
NiMH	nickel-metal hydride
NMI	nonmaskable interrupt
ns	nanosecond(s)
NTFS	NT File System
NVRAM	nonvolatile random-access mem- ory
OS/2	Operating System/2
OTP	one-time programmable
PAL	programmable array logic
PCI	Peripheral Component Inter- connect

Abbreviation or Acronym	Description
PCMCIA	Personal Computer Memory Card International Association
PGA	pin grid array
POST	power-on self-test
ppm	pages per minute
PQFP	plastic quad flat pack
PS/2	Personal System/2
PVC	polyvinyl chloride
QIC	quarter-inch cartridge
RAM	random-access memory
RAMDAC	random-access memory digital-to- analog converter
REN	ringer equivalence number
RFI	radio frequency interference
RGB	red/green/blue
ROM	read-only memory
rpm	revolutions per minute
RTC	real-time clock
SCSI	small computer system interface
sec	second(s)
SIMM	single in-line memory module
SMB	server management bus
SNMP	simple network management protocol
SRAM	static random-access memory
SVGA	super video graphics array
TFT	thin film transistor

Abbreviation or Acronym	Description
tpi	tracks per inch
TSR	terminate-and-stay-resident
TV	television
UL	Underwriters Laboratories
UMB	upper memory block
UPS	uninterruptible power supply
USOC	Universal Service Ordering Code
V	volt(s)
VAC	volt(s) alternating current
VDC	volt(s) direct current
VDE	<i>Verband Deutscher Elektro- techniker</i>
VESA	Video Electronics Standards Asso- ciation
VGA	video graphics array
VLSI	very-large-scale integration
VRAM	video random-access memory
W	watt(s)
WH	watt-hour(s)
XMM	extended memory manager
XMS	eXtended Memory Specification
ZIF	zero insertion force



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